Eco-logic cyborg

an urban waste recycler centre

Ecologic Cyborg:
an Urban Waste Recycler Centre

This document is submitted in partial fulfilment for the degree:
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I, Kutlwano Thai Malimabe (0410221w am a student registered for the course Master of Architecture [Professional] in the year 2011 I hereby declare the following:

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Kutlwano Thai Malimabe

Date

I'd first like to thank God for giving me the strangth and courage to get through the year. My greatest thanks and gratitude go to my parents for the showing me love and support (and the home cooked meals) throughout the years. To my brothers: Tumi, Thuso and my dear sister Thato for the words of encouragement and the crazy laughs.

I would like to express my deepest gratitude to my supervisor Ken Stucke for his excellent guidance and support. To Sipho Njobe, my mentor for all the advise and to Gerald Chungu and Lone Poulsen for all the extra crits. To the library stuff for all your help. Without you all it would have been next to impossible to write this thesis without your help and guidance.

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Last by definitely not least, I dedicate this thesis to my darling husband Christian Parkinson. Thank you for being my constant reality and always believing and supporting me. Thank you for always being my source of inspiration when times get tough (the running man) and for the patience you have shown me throughout. This journey has been easier to walk with you by my side. I love you and thank you.

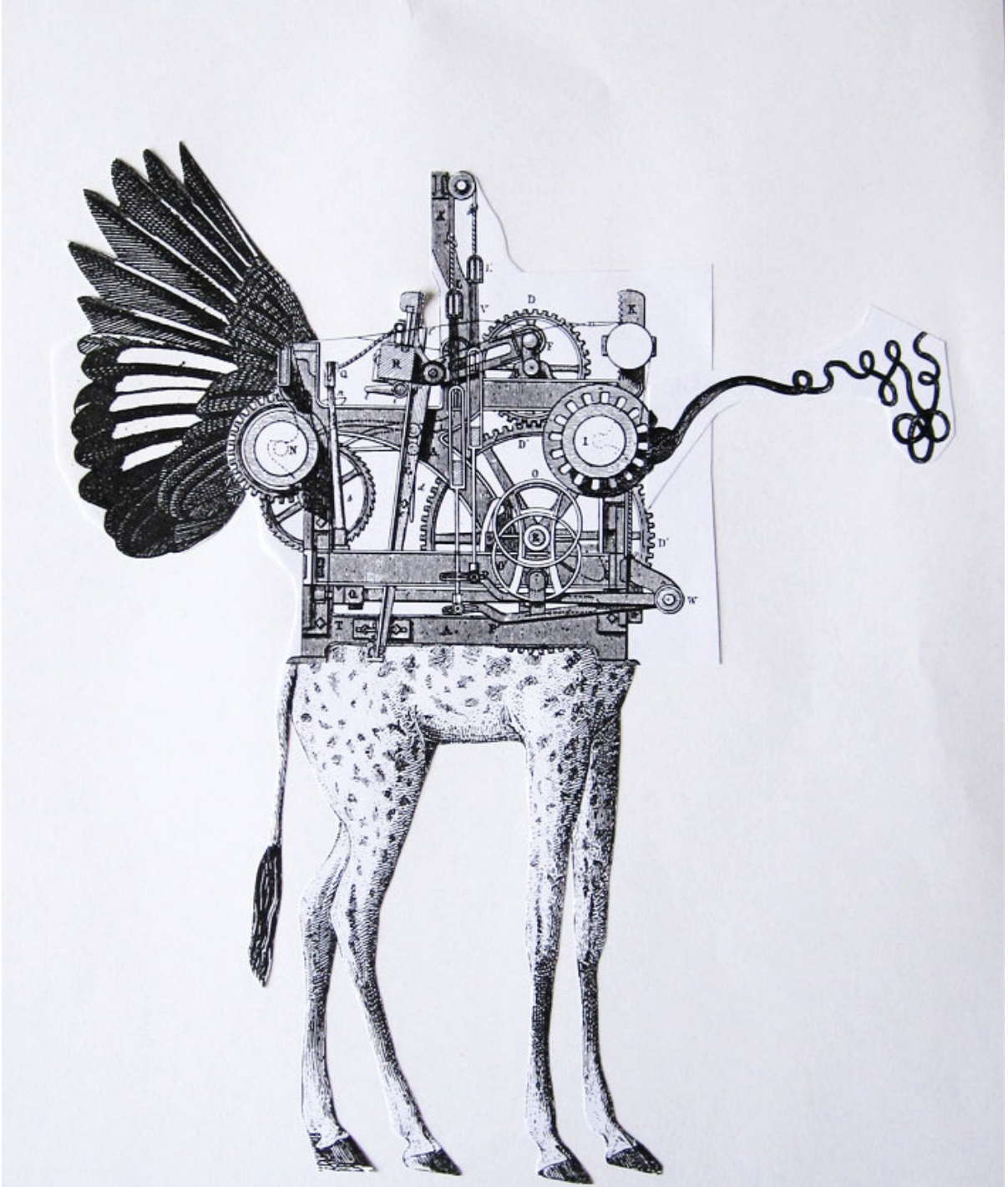


Figure 1: Early Industrialisation impact on nature. [www.karenlacroix.com- 2009]

ABSTRACT

"As we unleash living forces into our created machines, we lose control of them. They acquire wildness and some of the surprises that the wild entails. This then, is the dilemma all gods must accept: that they can no longer be completely sovereign over their finest creations." Kevin Kelly

Johannesburg as a developing city is lagging far behind in the waste recycling revolution. Our systems as humans are usually wasteful and create by-products that only end up in landfills and threaten the prospect of future generations while the natural resources offered to us by Mother Nature are slowly running out.

One of the main difference between natural systems and human systems; in terms of production; is that natural systems use a cradle to cradle concept; where outputs from one system are used as inputs into another system; where as humans systems apply a more cradle to grave concept, resulting in large amounts of waste being produced.

This project aims to create a space that raises awareness about waste and where people can be persuaded to start looking at wast e as more that just by-product but as resource. The first chapter discusses how ecosystems work in nature and how similar principals can be applies to reduce waste from human systems. The second chapter titled; Propaganda and Persuasion; discusses methods of changing people's perception. If we are going to get people to start looking at their waste differently, it is sometimes necessary to be persuasive and to use propaganda. The third chapter looks at the different methods that have been utilized through time to deal with waste. The chapters that follow use principals that have been extrapolated from the first three chapters to start designing a space that would, teach and raise awareness about waste.

Part 2

Theoretical Framework

ECOLOGIC: how do systems in nature work and how can similar principles be applied in the built environment ?

Figure 2 & 3: Industrial methods of construction coursing pollution to the environment. **[Saving water S.A, 2010 & Tree hugger, 2010]**

Humans and nature have been under the same ecosystem for millions of years. At one point humans worshiped and even considered themselves as one with, nature. Man nowadays sees himself as a separate entity from nature and sees nature as an element that can be abused for resources. Instead of nature's landscape our environment is now a grid of city streets and the only way that we experiences nature is by driving off into the country. We even think we are no longer dependent on nature. (Commoner, 1972)

About one third to one and a half of the world's ecosystem has been disrupted by human action. Carbon dioxide concentrations in the atmosphere have increased by nearly 30% since the industrial revolution while more species have been driven to extinction as most of the available resources are used by humans. By these standards we as human beings have drastically changed the nature of ecosystems and the environment we live in (Vitousek, 1997).

The climate we live in affects both plants and animals in the natural environment. Past climatic histories have been reconstructed by scientists to show how the ecology of continents has gone through major ecological shifts. The present Environmental (figure 1 & 2) crisis has been a global issue of great importance since the turn of the century. The

Figure 4: A construction worker working on the Empire State Building [Getty Images; nd]

state of our biosphere has been harmed in an alarming way and in that it is affecting human life (Rosenzweig, 1994). In order to triumph over the current situation we need to change the way we currently look at our problems as isolated events but more as systematic problems of interconnected events. There needs to be a radical shift in our perceptions and values and a way of looking at sustainable solutions that considers future generations. Lester Brown of the World Watch Institute describes sustainable societies as those that satisfy its needs without diminishing the prospects of future generations. (Capra, 1996). Nature has been designing sustainable systems for years and we therefore also need to go back and look at methods that it uses in its ecosystems and try and apply the same principals in our built environment as we are part of that system.

The built environment is one of the largest environmental disrupters. Buildings usually consume 40 percent of the world's energy and also produce 40 percent of the carbon dioxide emissions in the world's atmosphere. This comes from the transportation and production of materials before a structure is put up. Along with the emissions from the building process and running of the building after it has been constructed.

If all these processes were taken into consideration before and during construction, the destruction would be minimised. If there was a general consciousness of what one aspect or industry could have on the overall environment then surely there would be a change in peoples mind set.

Systems thinking and ecological studies are two fields of study that take into consideration the general outlook of entire systems, whether man made or of nature. They look at the interrelation and interconnectedness of all relationships with nature as inspiration. Man and nature are very much part of the same system and in order to overcome the current environmental situation we need to understand how man and nature can interrelate.

SYSTEMS THINKING

With the increasing global emphasis to lessen climate change, South Africa is still lagging far behind in the adaptation of sustainable systems and ecosystems. The government and some private sectors have realised the pressing need for a change in attitude from the general public towards the global crisis.

Systems theory looks at the interconnected web (figure 5) of all things and can be traced back to the 1930's when biologists, psychologists and ecologists formulated a criterion for this way of thinking. The emphasis was on the studying of the mind as a whole rather than as a collection of psychological parts and was described as a holistic way of thinking. This idea though, is normally associated with a German biologist, Ludwig von Bartalanffy who coined the name "General System's theory" which is a discipline devoted to formulating principles that apply to all systems (Sanal, 2004). After Bartalanffy's work, systems theory was then applied to other fields of work like the development of computer software products. One needs to realise that there is a difference between systems thinking, general systems thinking, soft systems and systems analysis although they all share common elements. Systems thinking in practice is about looking at the interrelations of objects rather than viewing things separately. It is about seeing the Forrest and the tree and viewing them from afar (Sanal, 2004).

Systems approach moves away from the isolation of objects viewpoint but one that rather looks at things as a complex network of intricate patterns that cannot be looked at in isolation. In systems, different components have different roles to play and when they are all looked at together they form a complex network that cannot be abstracted. When we look at a network of relationships between leaves, twigs, branches and a trunk we call it a tree even though there are still other systems that make up this tree (Capra, 1996). Heisenberg; a German theoretical physicist who made contributions to quantum mechanics; said what we observe is not nature itself but nature exposed to our method of questioning (Capra, 1996). Systems' thinking requires one to be aware of the interdependent nature of all patterns.

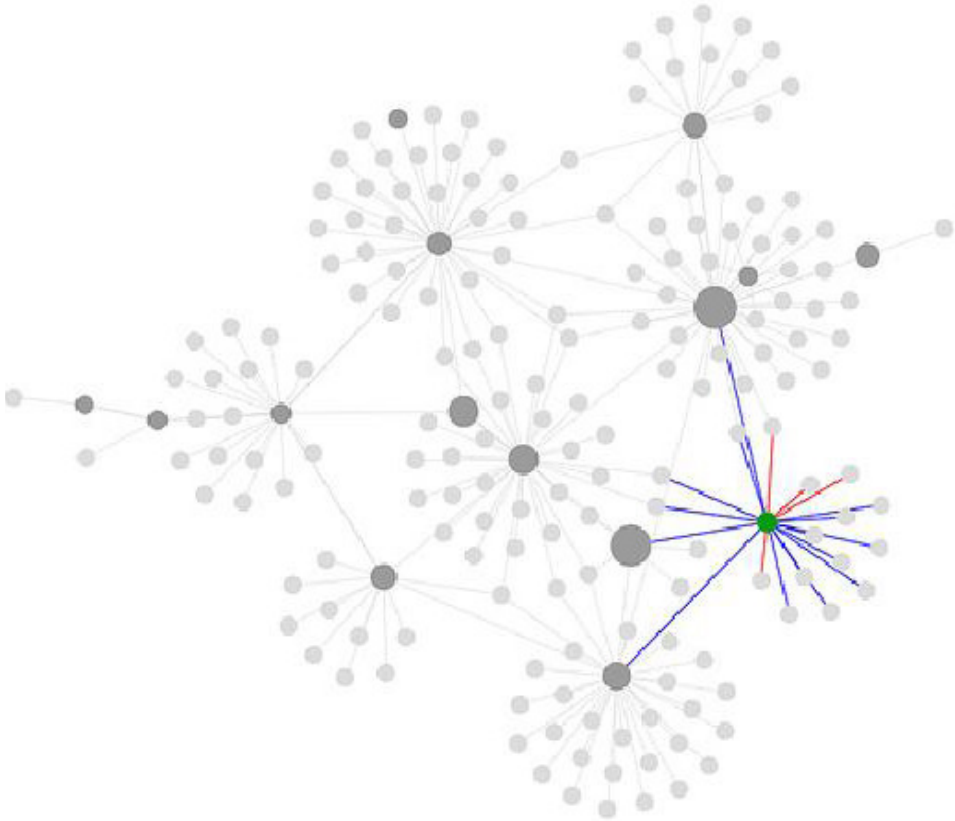


Figure 5: Web of interconnected events, one affecting another. [www.postgrowth.org ; 2010]

One can see this method of perception as part of the problem when it comes to our way of thinking, the fact that we sometimes don't see the bigger picture means that we have a shallow view and understanding of what is happening to our environment and therefore we usually come up with short term solutions that don't work in the long term. This can be seen as a Mechanistic way of viewing things (Capra, 1996). In some instances, people believe that in order for one to understand and analyse complex systems, the systems need to be broken down to basic parts to analyse and understand them as a whole. The problem with this method is that each part has a relationship and is sometimes dependent on other aspect of the system in order to be fully understood and can therefore never be looked at in isolation. Quantum physics has shown that there are no parts but rather, what we call parts are in actual fact patterns in a web of relationships (Capra, 1996).

In the 2009 documentary: "the age of stupid." A fictional historian who could be the last man on earth searches through archival footage from 2008 which was the last year man could have saved himself from global ecological collapse. He reflects upon the lives of several individuals amongst them an Indian businessman building a low-cost airline; a British community group concerned about climate change but fighting a new wind turbine development in the area and an American oilman who sees no contradiction between his work and his love for the

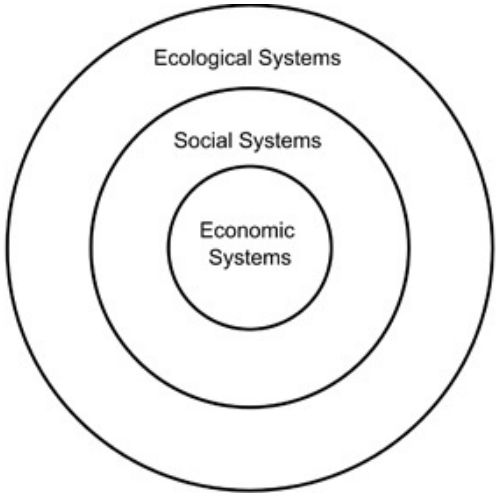


Figure 6: Cultural Norm system where an economic system is of the main importance- [www.arts.brighton.ac.uk :nd]

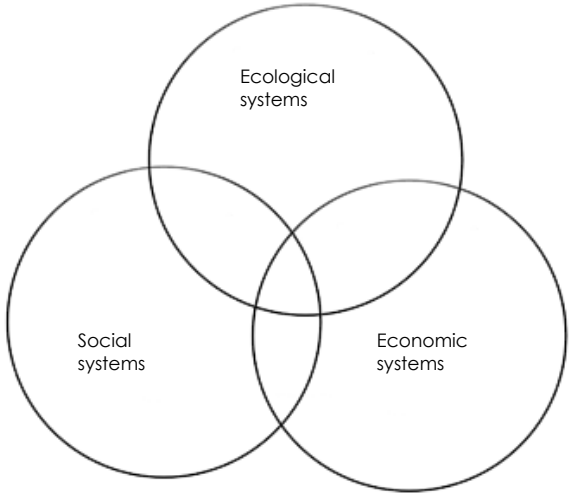


Figure 7: An interrelated approach method of looking at systems- [Author]

Figure: 8 Natural systems have that have been altered by human activity- [www.fightfortheworld.e-monsite.com ; nd]

outdoors. The historian wonders why we didn't save ourselves when we had the opportunity and if we were just being stupid. He realises that it has nothing to do with stupidity or mans self destructive nature but rather with culture. (Starke & Mastny, 2010)

Human beings have always been embedded and shaped by their cultural system. Cultural norms, values and tradition become "nature" to a person and a large part of their lives. Culture is also the driver behind the world's economy and politics even though it totally disregards nature as part of man and this has been to the detriment of our environment (figure 6 & 7) (Capra, 1996). Our 'cultural' thinking and norm in the way we create our built environments and the way we create wealth needs to change from one of looking at only parts of a scenario or looking at things in isolations but rather look and think about the whole systems.

In nature all systems work in a cyclic form where as human systems mostly work linearly. There is no top or bottom of any food chain as a lion in nature almost always ends up as food for bacteria, fungi, and scavengers in the wild, and therefore there is no waste. All natural activity depends on a single input of energy from the sun for processes such as photosynthesis.

Water is used as sustenance of life and a channel for all chemical processes to occur. All by products from different processes and systems get reintegrated into

other processes. The built environment as a profession deals with these same systems. (adityaathalye, 2006).Can we than not look at these systems and try apply them into our building? A deeper understanding of this cyclical action of natural systems could be the key to creating sustainable human systems.

ECOSYSTEMS

Man and nature are part of the same ecosystem, along with the sun, the stars and the rest of the universe. Man though, as advanced as he is, sees himself differently because he can generate his own power and create his own wealth. Due to his advanced nature, Man forgets that he too is part of an ecosystem. Fritjof Capra describes ecological thinking as a new paradigm of thinking. "Presently our leaders fail to see how the different problems are interrelated. The only solutions are those that are sustainable as sustainability has become a key concept in the ecological movement." (Capra, 1996)

Ecosystems are biological environments consisting of a web or network of organisms, interacting symbiotically in a self organised environment. The name ecology was first coined by a German scientist; Ernst Haeckel, a zoologist, artist and writer. Ancient Greek philosophers like Hippocrates of Cos and Aristotle, were among the first to record and make observations on the history of plants and animals and this was the basics of modern ecology. Ecosystems create a biophysical interaction between living and nonliving components of an environment that generate and regulate the biogeochemical cycles of the planet (UWC, n.d). They also provide goods and services that sustain human societies and their general well-being. Biodiversity is the full scope of all life and its processes that include genes, species and the ecosystems are an integration of the complex and regenerative spatial arrangement of all the types, forms, and interactions.

The world's ecosystem is a product of several billions of years and has been through evolutionary change. When the earth was first made, the elements hydrogen, oxygen, carbon and nitrogen were the main constituents that were in its makeup and after years of evolutionary change these elements were able to form even more complex molecular forms (Commoner, 1972). The by- products or 'waste' produced from the formation of the complex molecules provided an environment which made it possible to sustain life. The world environment makes up a large complex machine for living that has a thin dynamic layer on the earth's surface. Human survival and activity is dependent on the integrity and optimum functioning of this layer. Processes like photosynthesis which is the process where green plants create energy are also very important for human survival. (Commoner, 1972).

Human society forms part of the ecosystem and even though they only make up a small percentage of it they are still responsible for 99 percent of the pollution that covers the earth's biosphere (Yeang, 2006). For human survival to continue and survive, a stable environment is required. Currently, the thin life supporting biosphere has been destructed this could be because of the exploitative nature of humans towards nature (Commoner, 1972).

Reconnecting the network of ecosystems means building and nourishing current communities in order for them to be sustainable as this will satisfy our current needs without diminishing the chances of future generations. Studying ecosystems teaches valuable lessons on how to create these sustainable communities (Capra, 1996). Capra describes Ecoliteracy as a way of understanding the principles of the organisation of ecological systems and using the same principals to create sustainable communities (Capra, 1996). Creating Ecoliterate communities would mean educating business communities along with political communities as they are the ones who are able to influence the rest of the communities so that the principle of ecology becomes manifest in them (Capra, 1996).

Although nature and human systems belong in the same ecosystem there is a large difference between the two. Nature has no self awareness, no language, no consciousness, no culture, no justice and no greed or dishonesty and therefore human systems cannot learn these lessons from nature. What we can learn though is the self sustaining nature

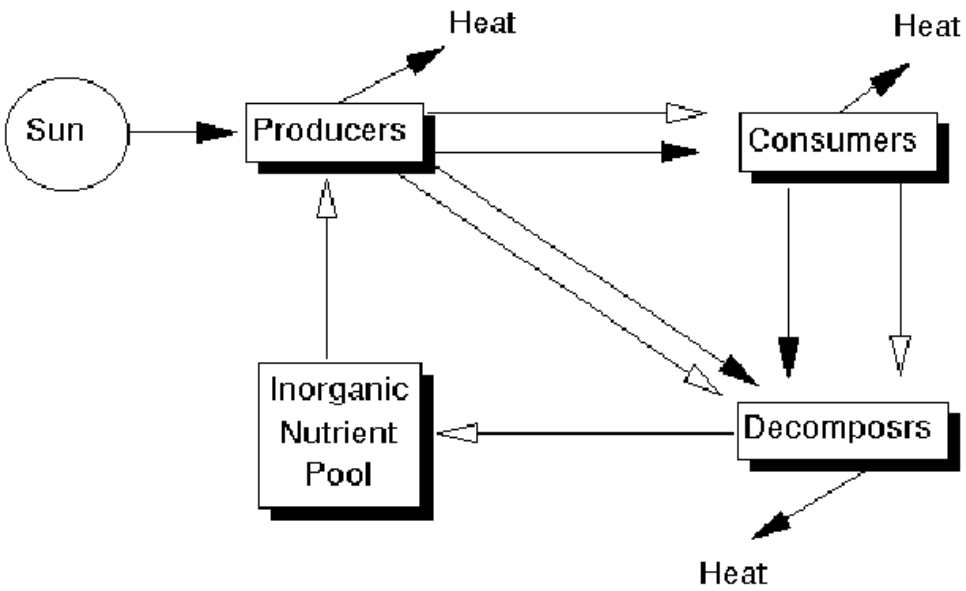


Figure 9: Energy flow though an ecosystem -[www.marietta.edu ; 2006]

of natural systems as this is the core of ecoliteracy. In order to understand the self sustaining nature of ecosystem, the basic principles of interdependence, cyclic flow of resources, and partnership are the main principles that make this possible and need to be understood (Capra, 1996).

1. INTERDEPENDENCE

Capra coined the term web to describe the interconnected nature of all members of an ecological system. All systems are also interdependence of each other within an ecosystem. Animals and plant species rely on a complex system of food for survival and it is this relationship that is essential for the web. In a typical ecological web, the sun provides energy for the grass; the grasshoppers would feed on the grass; the birds and frogs would eat the grasshoppers; the snakes would eat birds and so on until the animal dies. When it eventually dies, it is then decomposed by worms, fungi and bacteria action and nutrients are released back to the soil during the decaying process. The nutrients from the decayed components are recycled back into the grass and reused again by the community. A successful web depends on a successful relationship between all systems. (Capra, 1996)

As the built environment we are ecologically interdependent with the natural environment. Socially, culturally and economically humanity depends on nature for a sustainability future (Capra, 1996).

2. CYCLIC FLOW OF RESOURCES

Resources and nutrients are constantly being reused and recycled in an ecosystem in a feedback loop. All organisms produce waste but what is waste for one specie is food for another and therefore whole systems remain without waste. Organisms have evolved over billions of years by recycling resources like minerals, water and 'waste' to make life possible (Capra, 1996).

In order for communities to be sustainable, patterns of production and consumption need to be in a cyclic form and to achieve this there needs to be a fundamental change in the way we design our businesses and economy. This is a major clash between human systems and the ecology. Our industries and businesses have a linear flow as we take resources, transform them into products along with waste, these products are then sold to consumers who then discard them once they are done with them (Capra, 1996). This is a problem as vast amounts of land are filled with waste that cannot be reused and causing a significant damage to the environment.

Although natural systems and human systems both fall under the same ecosystem, the two differ largely because natural systems are generally closed systems when dealing with matter but are open to the flow of energy. This means the sun is the main source of energy. It is transformed into chemical energy by the photosynthesis of green plants and this is the process that drives most of the ecological cycle (Daily, 1997).

3. PARTNERSHIP

Partnership in an ecosystem is essential in order for the system to be sustainable. The cyclic exchange of energy and resources in the system are what sustains an all-encompassing partnership between all the elements. Since the creation of the first nucleated cells over two billion years ago, life was perceived through more intricate arrangements of cooperation and co-evolution. Partnership is one of the hallmarks of life (Capra, 1996).

In human communities, partnership means democracy and personal empowerment. Each member of the community plays a role that sometimes has no relation to the other and is for their own personal gain. In nature, as partnership progresses, the relationship between all the members develops more and there is a better understanding between all members (Daily, 1997).

The main difference between human economic systems; which is the main driver behind human systems; and ecosystems is that economies emphasise competition, expansion and domination while ecosystems emphasise cooperation, conservation and partnership. These qualities along with the ability to be flexible are what make ecosystems resilient (Daily, 1997).

Currently, the African Bushmen are one of the few people that still have a relationship with their environment. The Bushman lives in one of the harshest habitants on the earth where water and food are scarce and the weather plummets to extreme digits. These people survive in the Kalahari Desert because they have an intimate knowledge of the environment and thus have formed a partnership with it. (Commoner, 1972)

A number of environmental groups and movements have realised the benefits of looking to nature for inspiration. Some of these groups' works include looking at same of the principles that are used in ecosystems and systems thinking and have applied in everyday life and more significantly in the built environment. Groups like Biomimicry, Permaculture and Eco-Villages are some of the few that that look to nature for inspiration.

PERMACULTURE

The term Permaculture or permanent culture was first described as a whole systems approach to agriculture (Yeang, 2006). The first practice of this kind of systematic method was by an Australian farmer Sepp Holzer in the 1960's and the method was later scientifi-

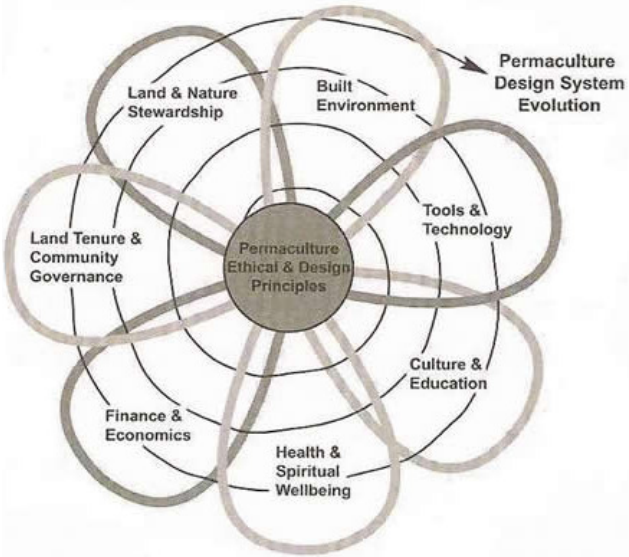


Figure 10: David Holmgren's permaculture flower- [www.baymaples.com : nd]

Figure 10: The concept of permaculture integrates things like climate, water energy etc. to create a sustainable system-[www.permacultureaschool.blogspot.com : 2011]

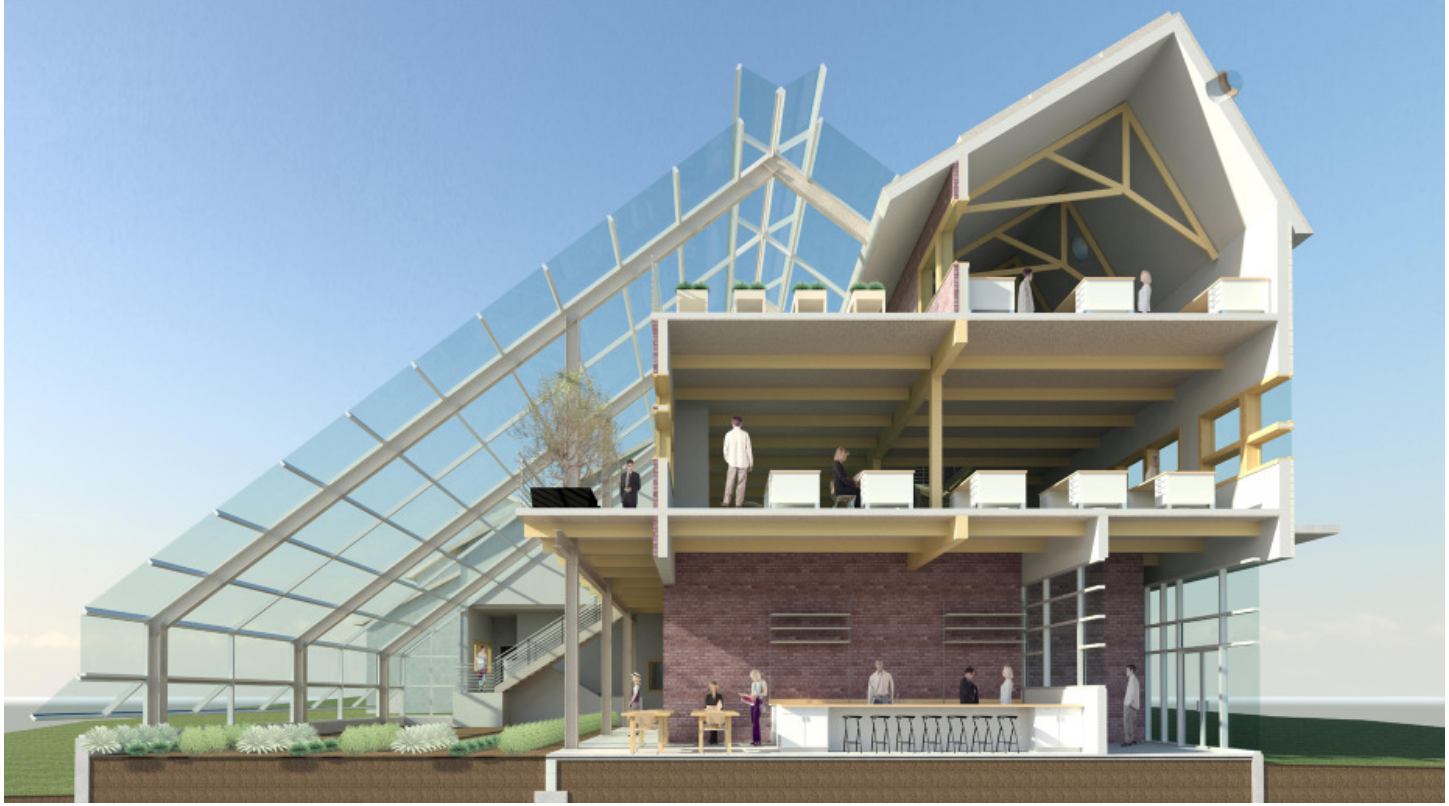


Figure 11: Sectional perspective of proposed green building hub in Jessup, Maryland- [www.enviro-center.com : 2005]

cally developed by Bill Mollison who is a researcher, author, scientist and teacher and was considered the father of Permaculture together with David Holmgren during the 1970's (fig 6). This was defined as a conscious method of the design and maintenance of human settlements and agriculture in a productive ecosystem that is diverse, stable and resilient like natural ecosystems. Mollison described Permaculture as a portmanteau of permanent agriculture, and permanent culture (UWC, n.d).

Permaculture uses the same ecological and biological principles and patterns that occur in nature. It aims to create a stable, productive system that provides for human needs while harmoniously integrating the environment with its inhabitants. The ecological processes of plants, animals, natural cycles and weather cycles are all part of the system (Harris, 1998). Elements in the system are viewed in relation to each other, where the outputs of one element become the inputs of another. Within a Permaculture system, work is minimised and 'waste' becomes resources and the environments are restored. Its principles can be applied to any environment, at any scale from dense urban systems to individual homes, from farms to entire regions (Yeang, 2006).

Permaculture uses ecological principles to plan for self –renewing and sustainable systems of food, water, and energy. It proposes that there should be a connected layout where related elements are place adjacently in order for the output of one system to be the input of another. It takes human controlled, energy demanding artificially designed landscapes and arranges them so that they work to conserve energy or so that they create more energy than they would need (UWC, n.d).

The basis for Permaculture is that, by training individuals about the core set of design principles; the individuals can design their own environments and buildings in an increasingly self-sufficient manner, one that reduces a society's reliance on industrial systems of production and distribution. Mollison identified this as one of the things that were destroying Earth's ecosystem (Yeang, 2006).

The Enviro Centre in Maryland, Jessup in the United States uses a combination of Permaculture and green architecture principles in its design. The building is described as "a hub for green building technologies and companies." The centre is a joint project between Wayne Weiseman, who is a designer and teacher and the founder of the Permaculture project together with architects like Stan Sersan and lacy Brittignham (Enviro-Center, 2005).

The centre, which aims to reclaim and balance the landscape, uses several interventions to create a self sustaining building. The

Figure 12 & 13: Japan's bullet train inspired by the king fisher bird- [www.treehugger.com: nd]

design uses an active integrated approach by utilising natural daylight and ventilation throughout the building and allowing individuals to control their own comfort levels in their offices (Enviro-Center, 2005).

The sun's energy is utilised with the aid of photovoltaic cells that provide energy to run the building. On site waste materials are recycled on the premises and gray water is also recycled and reused in the building. There is an integrated water harvesting system that collects rain waste and a filtration system on site that filters gray water (Enviro-Center, 2005).

BIOMIMICRY

Architecture that resembles plants and animals has been in existence around the globe for a long time. Fishlike buildings and bird like structure by Santiago Calatrava are some of the works that exhibit animal inspired architecture (Green, 2005). This method of inspiration can even be traced back from the French Enlightenment, Voillet le Duc to the "organic architecture" of frank Lloyd Write. The accessibility of computers in the 1980's meant that more complex and advanced forms of architecture can be explored (Design-boom, n.d).

There was and is no reason why architecture that resembles plants or animals cannot also behave like them. "This slavish imitation of nature is more the preoccupation of architects happier to play with shapes than to advance their practices through a serious engagement with the innovations offered by biology, bio-engineering and their allied sciences. Imagine if designs for the human environment adapted, flexed and evolved as living things do." Kevin Kelly, writer of the book, Out of control, thinks that this is the challenge that faces all designers. (Green, 2005)

Biomimicry or Biomimetics looks at nature's models, systems and processes and imitates

Figure 14: Eden project in Cornwall, United kingdom- [www.mevagissey.net :nd]

or takes inspiration from it in order to solve some of the human problems. The premises of Biomimicry is that nature and life has been designing and experimenting for more than 3.8 billion years, and some of the best ideas have already been developed by nature. Most of these ideas perform very well in their context and use energy and materials in a sufficient way. It is very likely that whatever the design challenges that we face, nature has already found a way and method of solving it (Janish, 2010).

The term Biomimetics is derived from the Greek word bios which means life and mimesis which means to imitate. It was first coined by Otto Schmitt who was an American Inventor, engineer and Biophysicist. He coined this word to describe the transfer of ideas from Biology to technology (society, 2007). In the 1960's a psychiatrist and engineer, Jack Steele coined the term bionics which was the science of systems that have some functions copied from nature. In 1982 Janine Benyus, a scientist and author popularised the term Biomimicry. Her book, Biomimicry: Innovation inspired by nature, describes Biomimicry as a new science that studies natures model's and then imitates or takes inspiration from them. (society, 2007)

Over the years a number of products have been invented from the inspiration of nature (figure 12 & 13). Products like Valcro fasteners, which are inspired by the burr seeds that stuck on dog's hairs and development of Gecko tape, which was inspired by the gecko's ability to climb vertical surfaces upside down and be able to peel their feet off the surface easily (Janish, 2010).

Building systems have also been inspired by nature amongst them the Eden project in Cornwall in the United Kingdom by architect Nicholas Grimshaw and engineering firm Anthony Hunt and Associates. The project in-

cludes the world's largest green house and has a collection of plants collected from all over the world. The buildings domed structure is inspired by bubbles in nature. It is made up by hexagonal and pentagonal plastic cells that are supported by steel frames. The bubble like surfaces meant that there can be wider spans and more floor area can be opened up (Harris, 1998).

CONCLUSION

Nature works is a way to achieve maximum results for minimum effort. Ecosystems are economies in nature and can provide innovative and progressive solutions to the environmental issues that we are faced with.

From the above chapter an assumption can be substantiated that both humans and nature make use of systems in their daily workings, even though each utilizes them in a different manner. In nature, relationships between all organisms are very important as there is a web that connects all organisms directly and indirectly. This interconnected nature of the relationships mean that outputs; also known as waste; from one organism or system are used as an input into another system. What is seen as waste to us is actually a resource.

Human systems on the other hand produce a large amount of waste. Our systems tend to work in a cradle to grave manner, where an output from one system usually ends up in landfill sites. Current environmental issues can also largely be because of this method of thinking as large amounts of land currently cannot be used as they are used for waste disposal. If we could switch our mind set from looking at our systems outputs as waste, but rather as resource, we would be well on the way of creating cradle to cradle systems

There is a lack general lack of education especially about the use of systems in a cyclic manner and that of using waste as resource. In order to create awareness and educate, people's perceptions have to be changed. The next chapter looks and analyses how people's perceptions were changed through the use of persuasion and propaganda in past times. These methods have been used to create shifts spanning over nations usually with positive results.

PROPAGANDA AND PERSUASION

When one thinks of propaganda, images of posters and adverts that were created by the governments urging people to join the army during war time come to mind (figure 15). Propaganda is a form of communicating with the aim of influencing people's attitudes and perceptions in an attempt to achieve a response that furthers a desired intent of the propagandist (Jowett & O'Donnell, 2001). The word does not only refer to the governments antics to get people to adapt to certain beliefs or way of thinking but also applies to the manner in which corporations in companies try to get one to buy their products (Cline, nd). The word first appeared in the 17th century when Pope Gregory the XV first established the Sacred Congregation for Propagating the Faith; a congregation of the Roman Curia in Rome responsible for missionary work and related activities. (Changing minds, 2002). Any organisation that tries to persuade a number of people towards a certain idea can be considered as propaganda as it often plays on ones emotions. (Cline, nd).

Propaganda is usually associated with negative connotations which are implied by words like lies, deceit, brain washing and spin doctoring (Cull & etal, 2003), thus many believed that it is a form of political manipulation. In English, the expression was originally a neutral term that was used to describe the dissemination of information in favour of any given cause and it sometimes even carried positive connotations. During the 20th century, the term started losing its positive aspects and acquired the negative connotations which are now associated with it when western countries started disseminating information that was often false, but "persuasive" to justified their political actions and ideologies. (Cull & etal, 2003)

Figure 15: World War propaganda poster - [www.mevagissey.net :nd]

Persuasion although very similar to propaganda, doesn't bare the same negative connotations as those that are associated with propaganda. The word is usually used to describe a more ethical means of creating social influence. It is considered as a more transactive strategy as it aims to satisfy the needs of both the persuader and the persuadee. One can find more honesty in persuasion rather than in propaganda as it does not resort to the same manipulation found in propaganda (Jowett & O'Donnell, 2001). Author of the book: "Propaganda and Persuasion" Victoria O'Donnell described persuasion as a complex continuative interactive process between a sender and the receiver created through the verbal and non verbal exchange of symbols. People tend to respond more to persuasion if it promises to help them in any way and satisfies their needs. (Jowett & O'Donnell, 2001).

Througho ut the ages, rulers and leaders have always tried to assert their presence by persuading societies through art and architecture. The Egyptians were one of the earliest to diversify and personalise a style of persuasion. They erected impressive public monuments such as the Sphinx and the pyramids to demonstrate prestige and dynastic legitimacy (Jowett & O'Donnell, 2001) .The pharaohs also gave thanks to the Gods by commissioning large buildings, statues and temples and saw this as an opportunity to show off their wealth and generosity to their citizens as well as to the people that were visiting. The pharaohs also had control of the news and carvings that were on the temple walls and could therefore persuade people to think a certain way of them. The Egyptian pharaohs Hatshepsut and Ramesses II used this method of disseminating information to legitimize their own reign. (Egypt's Golden Empire, 2006)

In the time between 50 BC and 50 AD, the Imperial Roman Empire started applying a more systematic technique of propaganda that integrated all the available forms of communication and symbology together to create a more effective and extensive network of control over its empire. The resulting image that was projected of Rome still remains and has become an integral part of the Roman Empire that we currently know of (Cull & etal, 2003). The Roman conquest extended over vast areas of land which created an issue of control over the whole empire. The Romans had to develop a strategy that would meet the needs of all their empires and develop a strong and highly visible government. The wealth and power that came with their conquest was used to a maximum advantage as a large sum of money was spent on symbolising Rome through architecture, art and literature (Cull & etal, 2003).

Julius Ceaser (figure16); who was a Roman general and statesman at the time; came up with a policy that combined all the Roman symbolism to form a kind of corporate symbol. He was also very particular in utilising persuasive techniques that were sophisticated throughout his rise to power as he

Figure 16: Bust sculpture of Julius Ceaser-[www.met-museum.org : 2000]

Figure 17 : Stories and messages were encoded in roman buildings- [www.wikispaces.com: nd]


DEUTSCHLAND SIEGT
AN ALLEN FRONTEN

always conveyed his message through the use of theatre and spectacle. This was done by spending lavish amounts of money on a triumphal procession, each representing a victory that was won during the civil war and each one was different (Cull & etal, 2003).

Architecture and urban design have always been used to demonstrate certain aspects of power and political manipulation and have also been used to control and subdue populations by push them towards a certain perspective. Architects and urban planners have been able to recognise the natural ability that is inherent in design to affect people's mood, temperament, and even the physical and social perspectives.

For years governments and state buildings have represented power and authority. Stern looking and very intimidating to the observer. Power is thus symbolically, visually and practically expressed through the exclusive feeling of the presence of the State. One can learn much about a political regime by closely observing these buildings. From castles to cathedrals to pyramids, architecture has always been able to served and glorify the ideals of a government at time.

One of the most recognised forms of propaganda was utilised by when Adolf Hitler came into power in 1933. After the Germany's defeat in the first world war, Hitler believed that one of the key reasons for Germany's defeat was the skilful use of propaganda by the British and Americans so when he came into power, He announced Dr Joseph Goebbels as the Minister of Public Enlightenment and Propaganda. The ministries purpose was to gain control of mass media and to attract the attention of the masses. (Pratkanis & Aronson, 1992)

The regime made sure that they were the main disseminators of news as it was very important to them that they gained the attention of the masses. Their propaganda also had to be entertaining to appeal to the masses. When Germany hosted the 1936 Olympics in Berlin, it was the perfect opportunity for them to promote the image of a strong "Aryan" nation and to build the self esteem of its people. Eye catching graphics as well as slashing and violent lines were used, and radio and news programs were packaged to also be entertaining. With the complete control of the press, radio, cinema, music, and the arts, the essential themes of the Nazi party were constantly repeated (Jowett & O'Donnell, 2001). It became impossible for one to read a book or watch television without the encountering the Nazi picture of the world. Goebbels spread the Nazi agenda by labelling events with slogans and terms that were easy to remember, that captured the people's attention and those that directed their thinking. In no time people's perceptions were in line with those of the regime. In retrospect the phrases that were coined created a picture in the heads of the Germans of a world reality. "The Russians and the British were in cahoots to get us; unfortunately there is unrest in England and we have our leader." (Pratkanis & Aronson, 1992)

With the help of German architects; Albert Speer; architecture was also used to package the Third Reich. Hitler dreamed of creating a spiritual and cultural rebirth of the German nation as part of the Third Reich and in order to do this he had to change people's opinions by first changing their perceptions (Taylor, 1974). The Nazi's extensively planned to erect public buildings such as sports arenas, assembly halls, cinemas and theatres all of which could also be used for political purposes. (Pratkanis & Aronson, 1992). Public buildings were designed to look similar to Greek temples with towering steps and rows of columns. The difference being that Greek temples were designed to the human scale where as Nazi buildings were massive, leaving the visitor feeling dwarfed by the power of the state represented by the building.

Nazi architecture had three key concepts in their design. The buildings had to be, 1: theatrical, 2: symbolic and 3: didactic in their creation. They saw architecture as a method of producing buildings that were functional, but also served a larger purpose. An example is The House of German Art; an art museum in Munich, Germany. The building housed art, but through its form, style and design it also had the purpose of being a community

Figure 18: Monuments were built to celebrate Germany's victories - [www.enotes.com :nd]

structure which was built using an Aryan style and acted as a kind of temple to accept German art (Global Oneness, nd)

1: THEATRICAL

The buildings were seen as stages for communal activity. The creation of these spaces was meant to embody the principles on which Nazi ideology was based upon. The Regime wanted to be directly and indirectly linked to a German past. The architecture would be directly linked by linking some of the regimes meeting places to sites that had a special purpose or those that had historical significance. Associating the buildings with events indirectly linked the regime with the German past (Global Oneness, nd). In events such as the May Day celebrations in 1936 which took place in Berlin, A Lustgarten; also known as a "lust garden"; was transformed into a stage by a creating an anonymous, pure space that was free in aesthetic from the immediate history of Berlin, but could still be associated with the aura of a Greek past. There was always a link between the new and the classical German past even though the new order was dominant (Global Oneness, nd).

Figure 19: Nazi architecture created to intimidate their people and showcase the regime's strengths and power - [www.darkroasted-blend.com : 2009]

2: SYMBOLIC

Determining what would be considered Nazi Architecture was problematic as the different members in leadership had differing and sometimes conflicting views and tastes. The National Socialist party then saw fit to classify the architecture under two main categories. The Architecture was either a version of neoclassical architecture or an imitation völkisch; which is a German interpretation of the populist movement; and national romanticism in buildings and structures (Global Oneness, nd).

The neoclassical style was primarily used for urban state buildings or party buildings and this style of architecture was not only used for the physical construction of the buildings, but also in the order of the columns used for the searchlights (Taylor, 1974).

The Völkish style was then primarily used in rural settings for accommodation and community structures. The style was also applied to new rural towns as it represented medieval time. The Völkish style was also used in a limited way for modern use buildings like weather service buildings and the administration building for the federal post office (Taylor, 1974). The symbolic nature of the buildings was so important that the form were sometimes decided long before construction was even decided upon. In some cases Speer had to design buildings that glorified victories that had not been won yet.

Symbolism and art inscriptions were prominent in all forms of Nazi-approved architecture. The eagle with the wreathed swastikas, heroic friezes and free-standing sculpture were some of the more common symbols. Quotes and phrases from Hitler's speeches were also placed over doorways or carved into walls. (Taylor, 1974).

3: DIDACTIC

Hitler considered architecture as "The Word In Stone," a method of engraving messages and conveying them in order to teach different lessons. The architecture was not only meant for general propaganda but it was also meant to communicate a specific message like the lessons of events at the Degenerate Art exhibition. Almost all modern art was described as Degenerate art and was banned as it was thought that the art was un-German or that it was Jewish Bolshevist. The art work was confiscated and exhibited accompanied by labels that ridiculed the art in order for form a public opinion against modernism. The exhibition was staged in Munich in 1937 and travelled to other cities in Germany and Austria (Global Oneness, nd).

The Nazis choice of using new versions of past styles of architecture can be seen as an effort to use aspects of the past to create a new present. Most buildings are very similar, but for the Nazis, mimicking historical styles linked them to an Aryan past which they felt was represented by Neo-classical and Renaissance architecture. Architecture was meant to act like a book by providing a place where a message would be held, with symbols used to communicate and teach. Like every other art form, it would be produced to serve the new Nazi regime. (Jowett & O'Donnell, 2001)

These attempts were not to recreate an actual past, but were to emphasize the importance of Aryan culture. Other nations including United States and South Africa have constructed government buildings in historical styles to convey a specific message across (Global Oneness, nd).

In a preliterate age, dazzling costumes, symbolism and monuments were deliberately created and designed that evoke a certain image to an audience. (Jowett & O'Donnell, 2001) Nowadays, Every time one turns on the radio, television or opens a book, magazine or newspaper we are constantly being dazzled with images from someone trying to educate us or trying to convince us to buy a certain product, persuading us to vote for a certain candidate, to subscribe to some version of what is right, true, and beautiful at the time (Pratkanis & Aronson, 1992).

Not all propaganda is bad. The concepts of propaganda and persuasion have been able to form an integral part of human communication in bringing about large scale shifts in ideas. It is sometimes very necessary to educate and shape people's opinions and behaviour in order to raise awareness and bring about change, the real danger lies when voices that are competing are silenced or restricted, usually resulting in negative consequences. Governments and other organisations have been able to address issues like climate change and public health with the help of propaganda and persuasion.

As discussed in the first chapter waste in human systems is a major issue. The use of propaganda and persuasion has been used and is still currently being used to create awareness on different issues that we are faced with. The following chapter will be looking and exploring the different methods that have been utilised to deal with waste through the ages and more specifically here in Johannesburg.

THE WASTE CITY

In Nomadic times, tribes had no concern with waste and sewerage as they often left the location which they lived in before the disposal of waste and sewerage became a problem. For tribes that were settling in a particular area, issues of sanitation had to be somehow be dealt with. Waste can be seen as portable materials which are no longer wanted by their owner and no longer have financial value whether being at that present moment or in the future. (Lemann, 2008)

Human systems and activities produce different kinds of by-products which are usually considered as waste. In the mid 19th century authorities tried to educate citizens on the subject of cleanliness and waste management. During this time waste which included human excrement, was discarded into the streets reaching heights of above a meter. The Increase in human population and growth due to urbanisation and industrialisation resulted in an increase in the amount of waste that was generated (Lemann, 2008).

Waste creates a number of problems which can be associated with the pollution of air, soil, rivers and groundwater and also creates health hazards, particularly in areas where there are people living there e.g. in informal

Figure 20: The streets of Amsterdam were filled with waste in the 1880's- [www.aebamsterdam.com: nd]

settlements. In Johannesburg, the city council has employed Pikitup Johannesburg as the official waste management service provider. The company which was founded in 2001 is privately owned but has the city of Johannesburg as its sole share holder (Pikitup, 2009). The process of Waste management employed by Pikitup usually requires the collection, transportation and processing of waste. In most cases, this process requires the disposal and monitoring of the waste material. The process is undertaken to reduce the health, environmental and aesthetics effects that are associated with waste. In waste management, all waste whether solid, liquid or gaseous is initially treated in the same manner then only later, an attempt to reduce the environmental impact of each material through the different waste management methods is made (Lemann, 2008).

Before materials could be processed, they are initially required to be collected from households, industries and commercial sites. The method in which waste is collected has an influence on which method of management is most effective. This can be seen as a main point of contact between the waste generator (households and commercials generators) and the management system (Hester and etal 2002).

The process of waste collection is done in a number of different ways and can either be operated as private or government programmes. In South Africa the main waste collection systems that are employed are in the form of; drop off centres, buy back centres and kerbside collection.

1.DROP OFF CENTRES:

Drop off centres are areas which have been designated for the drop off of individual recyclable materials and where People can take their recyclable goods which are in compliance with the sorting criteria of

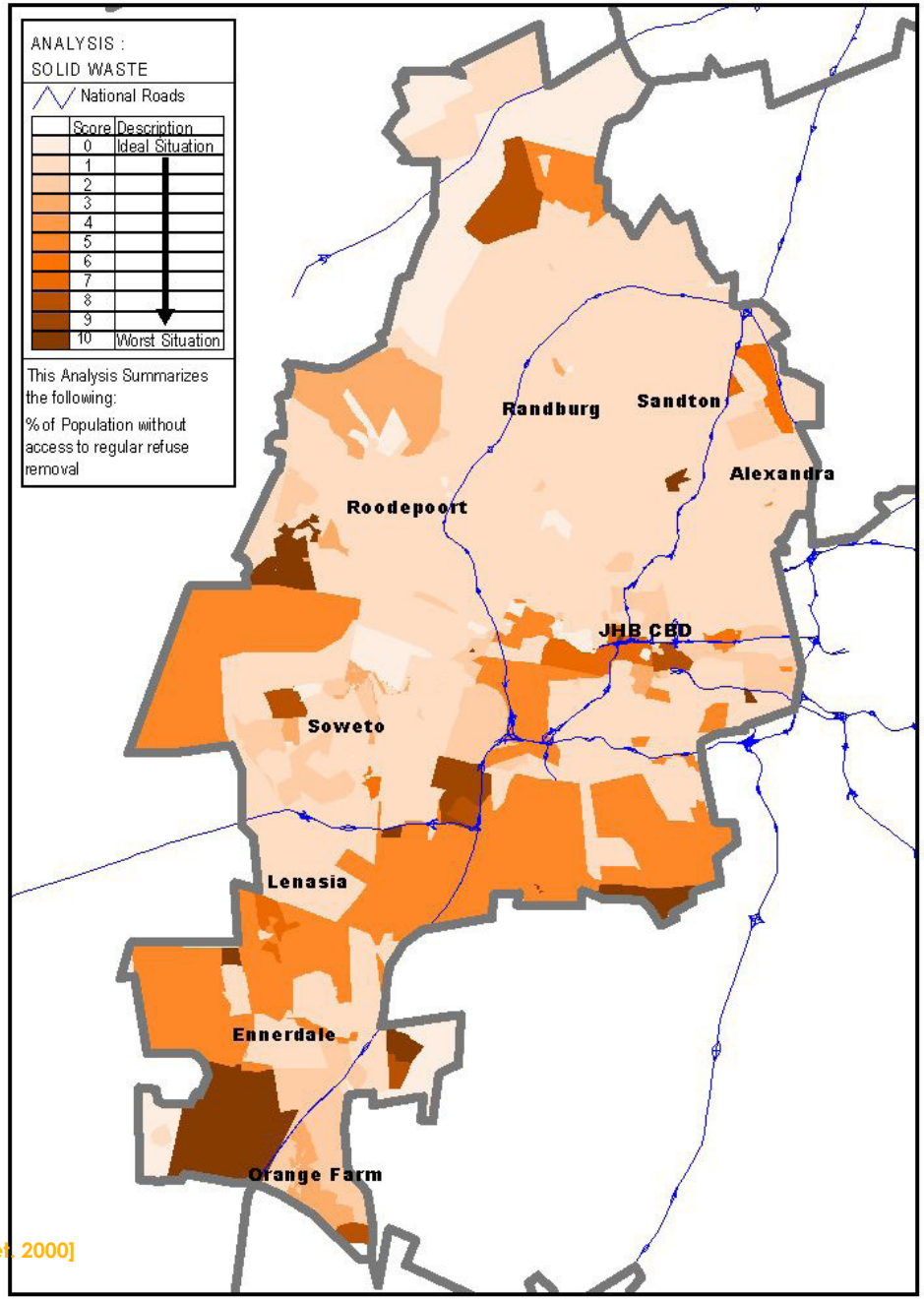


Figure 21: Map of Johannesburg showing area's with regular waste removal services- [www.ceroi.net, 2000]

the particular centre. These areas can also be seen as transfer stations where part of the recycling process, namely the sorting occours. With regard to concept of recycling this is a new concept although more and more drop off centres are being developed.

Different drop off centres may have different rules regarding the waste that is accepted but the general waste that is accepted includes plastics, metals, glass and paper while industrial waste is generally not accepted. Waste is then treated to reducing the amount of waste that is incinerated and waste landing in landfills.

In South Africa there is multiple drop-off centres dotted around the country. Some specialising only in the collection of one material; Collect-a-Can which specialise in the collection of beverage cans, Mondi recycling which specialises in the collection of paper and cardboard waste, and some collect all kinds of waste products ; Mama she's waste recyclers (Pikitup, 2009).

2.BUY BACK CENTRES:

These are facilities that are created to collect recyclables from different sources like shopping malls, residential areas, local schools, collectors and agents. These facilities operate by providing an incentive to the recycler and also from government subsidies. The processed waste is the sold to third party industries where they would be reused in other systems (installations classes ,n.d.).

Buy back centres are part of the cities initiative to provide employment for the cities informal waste traders also known as cart pushers. "The purpose of buy-back centres is to create employment and clean up the environment. We foster community involvement in the recycling of products whilst at the same time helping to alleviate poverty." Says Christa Venter; a Pikitup representative.

Figure 22: Kerbside waste collection - [www.gettyimages.com: 1999]

The centres become community based recycling centres where waste products like paper, plastic, metals and glass are bought from informal traders and then later sold to large corporate companies like collect a can and PETCO. The centres provide a direct cash payment and the traders are paid according to the amount of waste they bring (Pikitup, 2009).

In Johannesburg there are a number of buy back centres including areas such as Sandton, Yeoville, and Soweto with more currently being developed.

3. KERBSIDE COLLECTION

This is the collection method that is most commonly used in South Africa. Mixed waste is collected from households using purpose built vehicles. The waste can either be sorted ready to be recycled or in some cases the waste ends in landfill sites. Waste management in countries where households are required to separate their waste into colour coded bins ready to be recycled is more cost effective and efficient as the recovery of materials is made easy. The method of collection has an effect on the recovery of the materials as well as the energy required for the recovery (My green choices, nd).

Different cities and nations deal with waste in a different manner and recently the emphasis on waste management has been on the prevention of pollution and the minimising of waste at the source. The treatment of waste is a metabolic process which creates by-products and residue as the process occurs. It also sets about to isolate, convert and to reuse waste materials so that they have less impact on the earth, water and air and that there is very little disturbance done to the ecosystem (Lemann, 2008). Waste management entails different mechanisms of disposal with the hierarchy suggesting that the process will minimise waste over time. There are three main methods of waste disposal; land filling, Incineration and recycling.

LANDFILL SITES

Landfill site are also commonly known as rubbish dumps or tips. They can be in the form of a large hole in the ground or an area where waste is allowed to pile up above ground. Historically this was the most efficient method of disposal and is still commonly used in most areas around the world but caution should be taken as these sites should be in areas where waste can be managed without imposing on people's health especially if the site is located close to an area where people live; if the site is poorly developed and if the sites are badly managed.

These sites can also be used as temporary storage places for waste and also as a sorting area before processing for recycling. It is estimated that the total amount of urban waste in South Africa is 15 million tons a year while Industries contribute 25 million tons a year (Enviro-Info,n.d.). Approximately 95% of this waste is disposed of on land, either in open trenches or in sanitary landfill sites. There is currently about 1200 landfill sites in South Africa, most of which are operated by local authorities. In Johannesburg there are currently four landfill sites which are still operational located in Daveland, Roodepoort, Turfontain and Lawley. Official landfill site should have a permit issued by the Department of Water Affairs and Forestry in consultation with the Department of Environmental Affairs and Tourism. Currently it is difficult to create new landfill sites as more and more of the old ones are being filled up (Enviro-Info n.d.).

INCINERATION

This is the process of waste disposal which involves the burning of organic substances in waste materials. The process converts the burnt materials into ash; which is mainly made up of inorganic components from the waste, flue gas; which requires to be cleaned of pollutants before being dispersed into the atmosphere and heat which can be used to generate electricity. Using this method of waste disposal reduces the solid mass of the original waste materials mass by 80-85 %depending on composition and quantity of recovery of materials.

Incineration does not completely replace the use of landfills but it does reduce the volume of the waste that is being disposed and for the disposal of certain waste products like clinical and hazardous waste where pathogens and toxins can be destroyed by high temperatures. Although incineration is effective in reducing the volume of waste it does however disperse harmful gasses into the atmosphere.

Figure 23: Vast amounts of land being used for waste landfill sites- [www.blogoffun.wordpress.com: 2008]

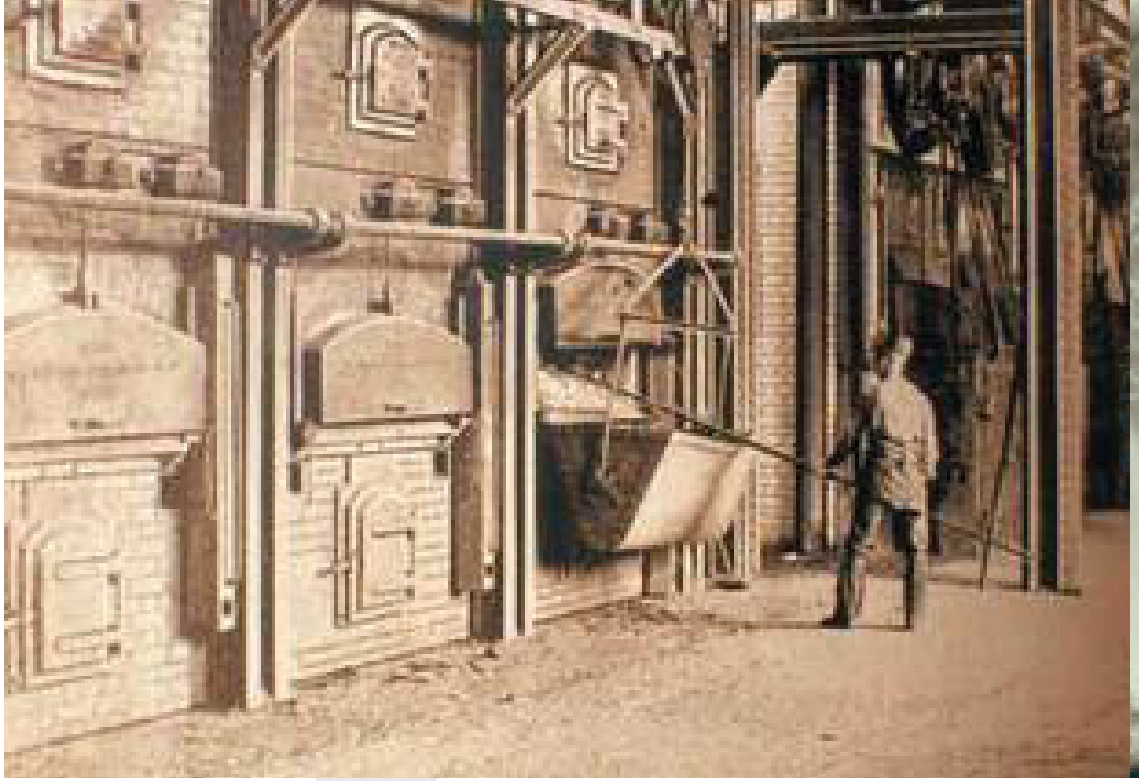


Figure 24: One of the earliest methods of waste Incineration in the mid 19th century - [www.waste-management-world.com : nd]

Figure 25: Workers salvaging materials that have been discarded- [www.thisweekinearth.com : nd]

RECYCLING

This method of management entails a more holistic approach to dealing with waste. The recycling process reuses waste materials which would otherwise have been discarded of in a manner that is most environmentally appropriate. These materials are reprocessed into new products in order to prevent the wasting of potential resource materials and to reduce the consumption of fresh raw materials. Energy consumption is reduced when recycling as less energy is required to process materials and the need for landfill sites is also reduced. Materials which are commonly recyclable include different kinds of glass, paper, metal and plastic (My green choices, nd). Biodegradable waste such as food or garden waste is usually not considered for the purpose of typical recycling although it is commonly used in composting and recently for the production of methane gas with the aid of bio digesters which can then be used to generate power.

The concept of recycling has been of common practice for the most part of human history and can be traced as far back as 400BC. Archaeological studies hav e revealed that ancient waste sites contained less household waste such as clay pots and broken tools which implied that more materials were being recycled in the time when raw materials were scarce. During the post industrial times, scrap materials such as bronze and other metals were being collected, melted and reused by informal collectors. In Britain, dust and ash from coal fires was collected and reused as a base material for the making of new bricks (Siegle & Hanaor, 2006).

The industrial period brought about the need for affordable materials. The use of scrap metal became more desirable as it was much cheaper to use than virgin material. Rail road's also started purchasing and selling scrap metal along with the steel to the automobile industries. By 1939 Britain had

launched a paper salvaging programme to encourage the recycling of materials in the aid of the war efforts (Siegle & Hanaor, 2006).

In Johannesburg, The city has introduced a new integrated waste management policy which seeks to minimise the amount of waste that goes into landfill sites and to extract as much resource from the waste that is collected as possible. Currently the standards state that only 10% of the waste stream should end up in landfill sites. Waste management company Pikitup, has a strategy that includes the separation of waste products by household into different bins for recycling in support of the national vision of 'Zero waste to landfills by 2022 (Pikitup, 2009)'.

In order for a recycling programme to work, a large supply of recyclable materials is required. Waste is more costly to clean up once it is on the streets and in public spaces rather than when it is collected from people's homes. To implement a recycling process, the government usually sets aside options for recycling which include:

1. Mandatory recycling collection: where cities set themselves targets in the form of percentages for materials they want diverted from the cities normal waste system. The city would then be responsible for meeting the set target.

2. Container Deposit: Where a deposit is offered for the return of certain containers (usually plastic, metal and glass). A surcharge is added onto a container price and can be claimed back by the consumer on the return of the container to the collection point.

3. Refuse bins: products such as used oil, old batteries, tires and garden waste have been banned from being disposed of with regular waste products (glass, metal, paper and plastic). The aim is to supply refuse bins for the different materials which are being disposed of. These bins also provide a viable system for the disposal of banned products.

The Brundland report; formally known as the World Commission on environment and development states that sustainable development can only be achieved if societies in general and industries learned to produce more from less of the worlds resources while generating less pollution and waste (Forbes & etal, 2001). From the above it is clear that a new method of waste management is required in order to preserve the natural resources that are slowly running out. Looking at waste as resource means that less of the natural resources would be used.

Other methods such as incineration and the use of landfill sites are not so effective as they usually cause more harm to the environment. One of the requirements for a recycling system it a large amount of recyclable materials and Johannesburg city does have a large amount of waste to make this system viable. This is also effective as a sustainable system as it creates jobs for the informal traders, cleans the environment and requires less energy use. "We need a paradigm shift, to move away from disposal towards the avoidance of waste." Said Marvelous Nengovhela; a waste management specialist at the South African Local Government Association. (Main, 2011)

From the above chapter, the method of recycling seems to be the more effective method of waste management. It is also a method that utilises a similar concept as that in of nature of using out puts from different systems as inputs to be used in other systems. It is also similar to natural systems as a in order for a recycling system to work, it is usually connected to other industries creating a web similar to that of organisms in nature.

Part 3

Programme and Translation

Chapter 4

BRIEF AND PROGRAMME DEVELOPMENT

In chapter 1 the question was asked: how do systems in nature work and how can similar principles be applied in human systems, more specifically, to the built environment? From that investigation it became clear that the main difference between the two systems was the concept of inputs and outputs; in natural systems; where waste is seen as more of a resource than as by-product thus creating cyclic systems. From that I propose a project that deals with waste in a manner similar to that in nature by turning it into resource.

It is mainly due to the lack of knowledge and awareness that our systems still produce large amounts of waste and it is because of this, that waste has become one of the prominent features in our landscape. The second chapter dealt with using methods of propaganda and persuasion in order to change people's perceptions and to even educate them about different issues from politics to social issues. My proposal is to use architecture as a vehicle to raise awareness and to create a general consciousness of how can be waste into resource.

The third chapter looked at the different methods that have been and are being used for waste management. From that an assumption can be made that the system of recycling is one that is very close to that in nature where "waste" is made into resource. One other the other principle in nature is that one system should cater for more than one other system. From all the above, I propose to create a recycling centre that will educate and raise awareness of how different kinds of "waste" can be used resource.

This chapter deals with the development of a programme for the Recycling Centre and the selection of a site. Through the study of the spaces required for the recycling process and the educational aspect of the building, a brief for the building will be determined and a suitable site will be chosen through the requirements that will be discussed later on in the chapter. The fusion between the recycling process, the educational facility and the site will create a typology of building that will hopefully be persuasive and change people's perspectives about waste.

Figure 26 & 27: Waste tip in Leicester- UK- [Author]

RECYCLING REQUIREMENTS

Different materials go though different processes during the cycle of recycling but they all start at the same point being that of collection. This process is unique in that materials that would otherwise have been discarded are now used as resource. Products such as paper, plastic, glass and tins require a relatively easy process of recycling and are therefore the recycling process becomes efficient. (Benefits of recycling, 2010)

PLASTIC RECYCLING

There are about 50 different types of plastic materials with the main ones including; HDPE (opaque bottles), PVC (transparent bottles with a seam across the base and PET (transparent bottles with a hard mould spot in the centre of the base.

Most plastic recycling processes start off with the material being manually inspected to check if there are any contaminants like rock, glass and general materials that are not plastic. The next step would be separating the plastic materials into the different categories of HDPE, PVC, etc. The materials will then be washed. Chopped and dried. Some sorting facilities stop here and package the shredded plastic into bundles ready to be sent to third party industries in some cases the shredded plastic is melted and made into pallets which will be used in the process of making other plastic products which include clothing, carpeting and new plastic bottles.

GLASS RECYCLING

Glass is 100% recyclable and can go through the recycling process over and over again without compromising the quality of the end product. Glass mainly comes in three colours namely flint (clear), green and amber (brown). (Enviroserv; n.d.)

Glass is first manually sorted to ensure that there are no non glass materials going into the glass recycling process. The materials are then washed to make sure all paper and plastic ladles have been removed from the glass. It is then crushed and separated into clear, brown and green particles through infrared. The glass cullets are then stored in bags ready to be sent off to third party industries.

METAL RECYCLING

Metals are generally separated into 3 groups: aluminium, steel and other and can be tested by using a magnet. The process of recycling old metal products uses 95% less energy than manufacturing it from new materials.

For the metal recycling process, the separated materials are cleaned, compressed and bailed ready to be sent to third party industries.

PAPER RECYCLING

Paper is one of the most valuable materials to be recycled. The wood fibres in the paper can be reused five to seven times before they are brittle. In South Africa more than 40% of the paper that is consumed is recycled vs 64% in the European Union (Enviroserv; n.d.).

Waste paper is manually sorted into cardboard, white paper and other. The separated paper is then compressed and bailed ready for third party industries.

The four above are not the only materials that can be recycled. Materials like organic waste and recently sewage water are some that can be recycled.

Organic waste has always been reused to create compost but has recently been used in the creation of Biogas. This is made from methane which is produced during an anaerobic digestion process of organic materials.

Organic materials are fed into a biodigester tank in which the anaerobic process occurs. During this process, the absence of oxygen

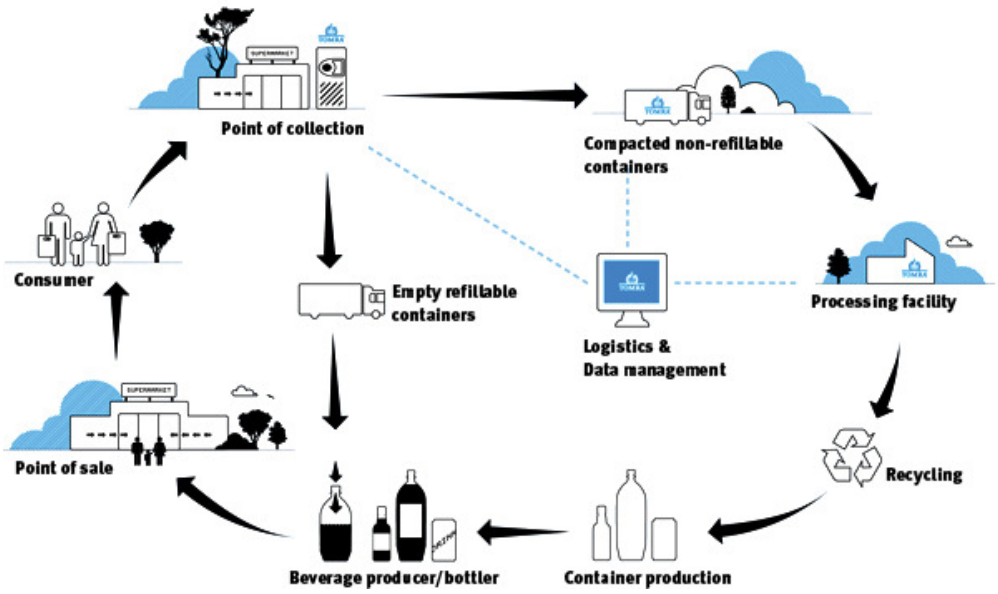


Figure 28: Waste deposit loop for plastic materials. [www.tomra.com : nd]

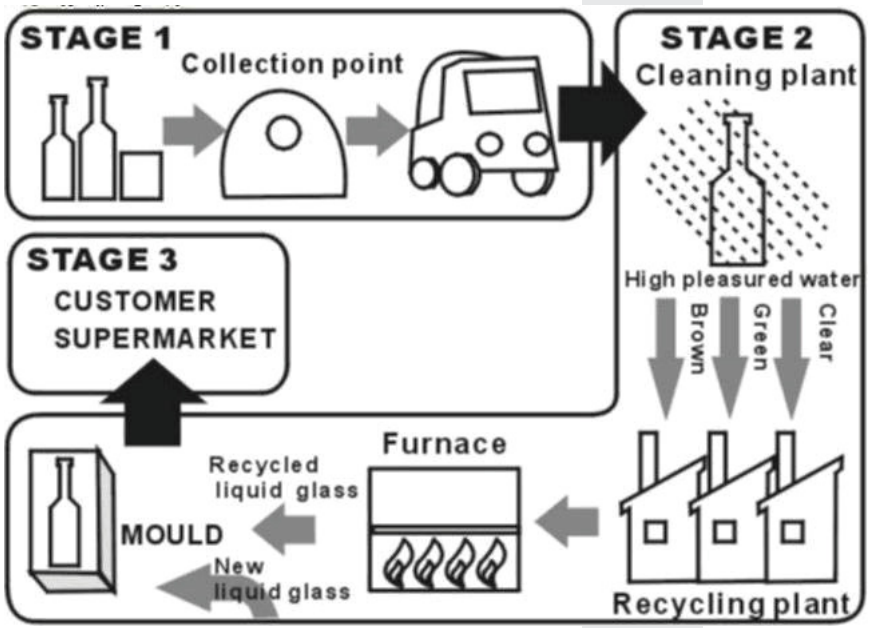


Figure 29: Waste deposit loop for glass materials. [http://www.cnliuxue.org: nd]

helps the microorganisms that are present in the tank break the materials down. The decomposed materials then give off methane gas which can be used to generate power.

SEWER WATER TREATMENT

The process is also known as Reclaimed water mines the water from the main sewer and treats the water to be reused for non- portable use.

The water is mined from the main sewer line while allowing most of the water to pass through. The water then goes through the first phase which is the primary treatment. Chlorine is added and some of the solids are expelled back into the sewer line. The next phase is the secondary treatment phase that includes the aeration settling, this is the process of bringing water and air into close contact in order to remove gases that have already dissolved in the water. The 3rd and final stage involves gravity filtration and finally adding chlorine before the water is stored ready to be reused.

waste collection and sorting structure

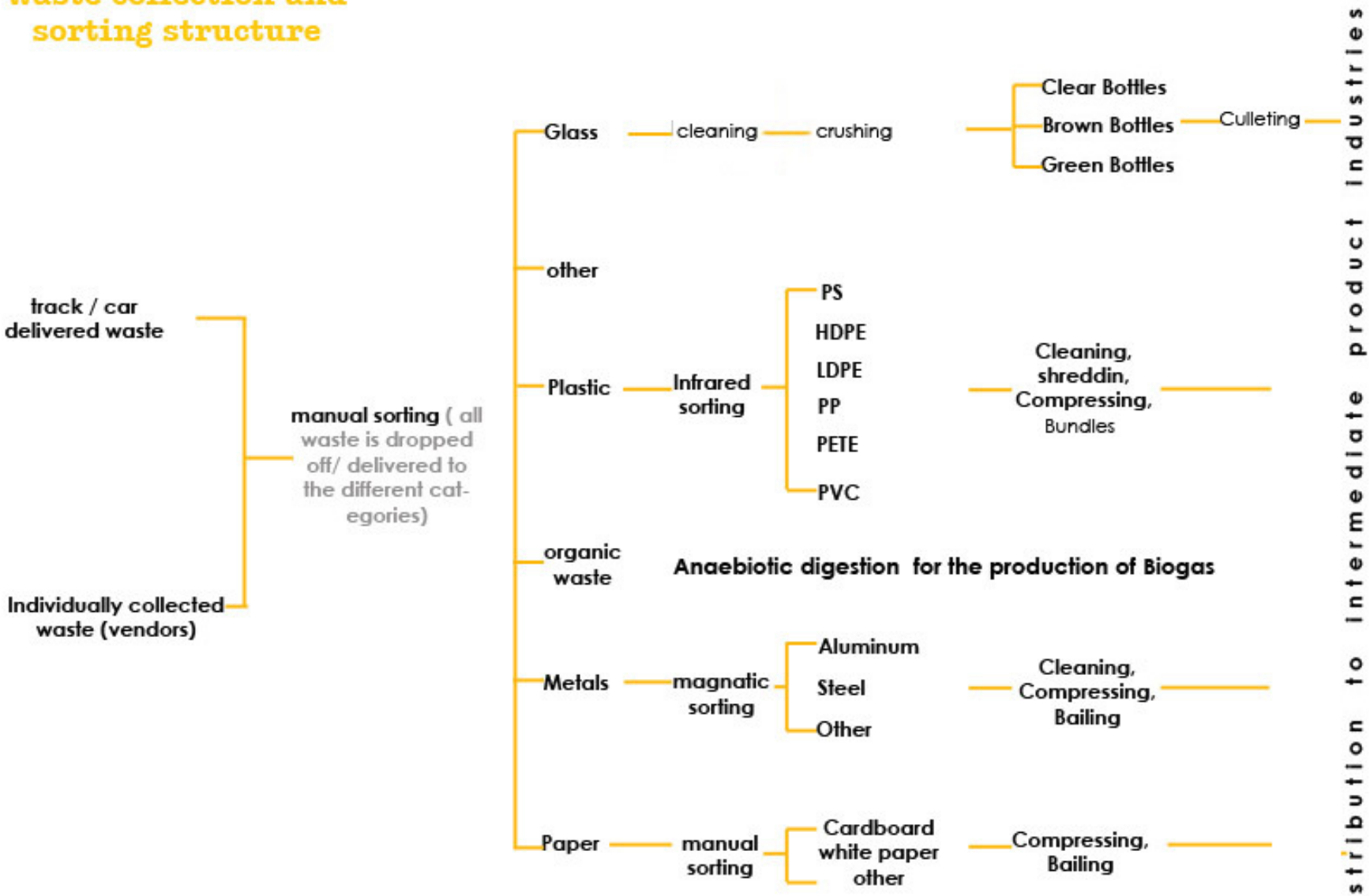


Figure 30: A summery of how the recycling process would work in the building. starting off with the waste being dropped-off by either pedestrian by vehicles and ending with the processed goods being distributed to tertiary parties

Figure 31: The Global Day of Action march in Johannesburg -[www.globalclimatecampaign.org : 2010]

Recently there has been a lot of nature activism coming from different government and non-governmental organisation promoting the green evolution and in support of recycling. organisations like Pikitup; WWF ; Green Peace South Africa and Earth Life Africa are some of the organisations which deal with raising awareness on environmental issues and conservation methods.

The global day of action march (Figure 31) is one of the biggest demonstrations against climate change organised as collaboration between different groups which includes NGO's, CBO's, faith communities and trade unions. The aim of this march is to raise awareness about the political, socio-economic and environmental inequity of climate change .The aim in this project is to bring together such organisations under one roof so as there could be a form of support network between the organisations.

As education is one of the methods of changing people's perceptions, the educational facility will also aid in raising awareness. This component of the facility will be mainly aimed at kids so as to get them involved in recycling. The spaces will include exhibition and gallery spaces, meeting rooms and auditorium spaces.

The main inspiration behind this project is nature and systems in nature. That concept is explored more with the Introduction of green systems within the building. These will be in the form of roof gardens, internal court yard spaces and external green balconies and will act as break spaces within the building.

BUILDING PROGRAMME

EDUCATIONAL FACILITY

(Public inter phase)
- General gallery space
- Office space
- Storage space
- Meeting rooms
- Auditorium
- Lecture room
- Green space
- Recycling workshop space
- Book shop
- Information area

RESTAURANT

(Public inter phase)
- Kitchen
- Storage area
- Seating area
- Office
- Bar area
- Delivery area
- Toilets
- Green space

RECYCLING FACILITY

- Reception area (public/private)
- Car drop-off area- car scale
- Pedestrian drop- off area - scale
- Payment office
- Waste processing area
- Processed goods Storage
    - Plastic
    - Cans
    - Paper
    - Glass

- Manual Sorting area
- Bailing and storage
- Office space
- Bathrooms /shower area

OFFICE SPACE

- Space to be rented to environmental activist organisations

OTHER

- Green space
- Security and monitoring
- Cogeneration unit
- Biogas digester
- Grey water treatment
- Sewage water treatment

Figure 32: Wordle generated from the theoretical framework to help generate some themes for the building . [Author]

Part 3

Precedent Studies

Five building were chosen to be discussed as precedent studies in the following chapter. Not all the buildings that were chosen accommodate recycling processes, some were also chosen for their aesthetic and architectural influence.

The first study is on Lloyeds crossing development in Portland Oregon by Mithun architects and urban designers. The development hasn't been built yet but it proposes an eco development. One of the developments' proposal is to reuse reclaimed water for all its non –portable water use, which means it would be the first neighbourhood to come off the city's municipal grid.

The second is the Metal recycling plant in Pivka, Slovenia by architects Dekleva Gregoric. The building design employs a method of contrasting the rough almost chaotic element of production with the clean rectangular forms of administration buildings.

The Maag recycling facility, located in Winterthur Zurich from architects Open Operating system is the third building discussed. The facility was envisioned to perform a multitude of functions besides those of recycling by combining the function of the recycling centre with a roof top park that's used as a break away area for the employees in the building.

The valdemingomez recycling plant from the architects Abalos and Herreros was chosen as the building is about addressing a social issue of waste and waste management though education.

The fifth building is the Pompidou centre in Paris France by a team that included Renzo Piana and Richard Rogers. The centre which houses a number of functions that include a public library, a museum and a music centre is designed in a high-tech style. The insides and functions of the building have been exposed earning it its high-tech look.

The last building is the Menara Mesiniaga building by architect Ken Yeang. The building utilizes principals of a bio-climatic building by taking the buildings site into consideration while designing. The building also utilizes the use of green spaces in the building for climate control and sun shading.

Lloyed Crossing-

Mithun Architects and Urban designers

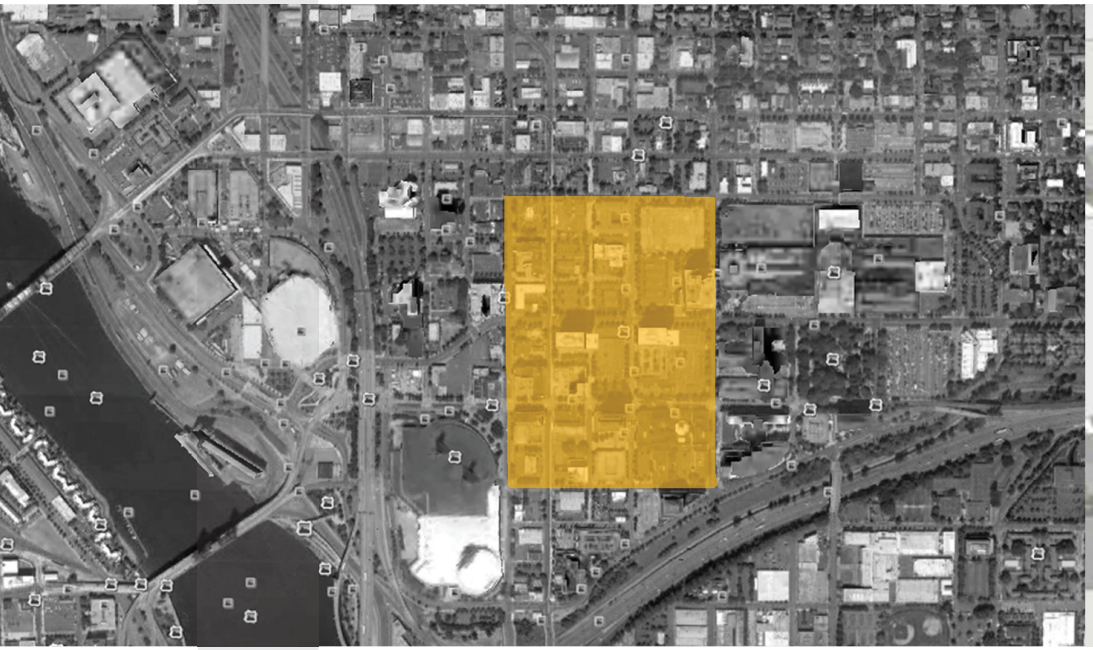


Figure 33: Development for Lloyed Crossing Eco- District on Portland, Oregon. [Google Maps]

Figure 34 : A portion of the development that will be a catalyst for the whole development to demonstrate the economic feasibility of the development.

Lloyed crossing is a redevelopment plan consisting of a 35 block mixed-use section. The development is located in Portland, in the United States. The block is meant to consist of elements like sustainable streetscape designs, large scale rain water harvesting and urban forestry. The use of a black water treatment plant along with photovoltaic modules and wind turbines are mean that this section would be the first neighborhood to come off the city grid. The buildings would share energy and water reducing the consumption levels that would otherwise be provided by the municipal.

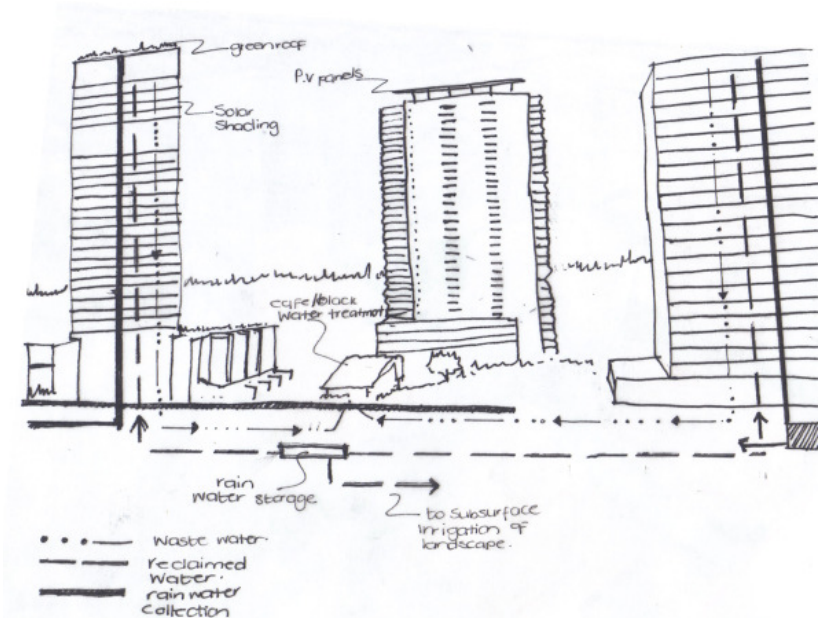


Figure 35: The water is treated on a nearby treatment plant and is distributed to all the buildings in the development. [Author]

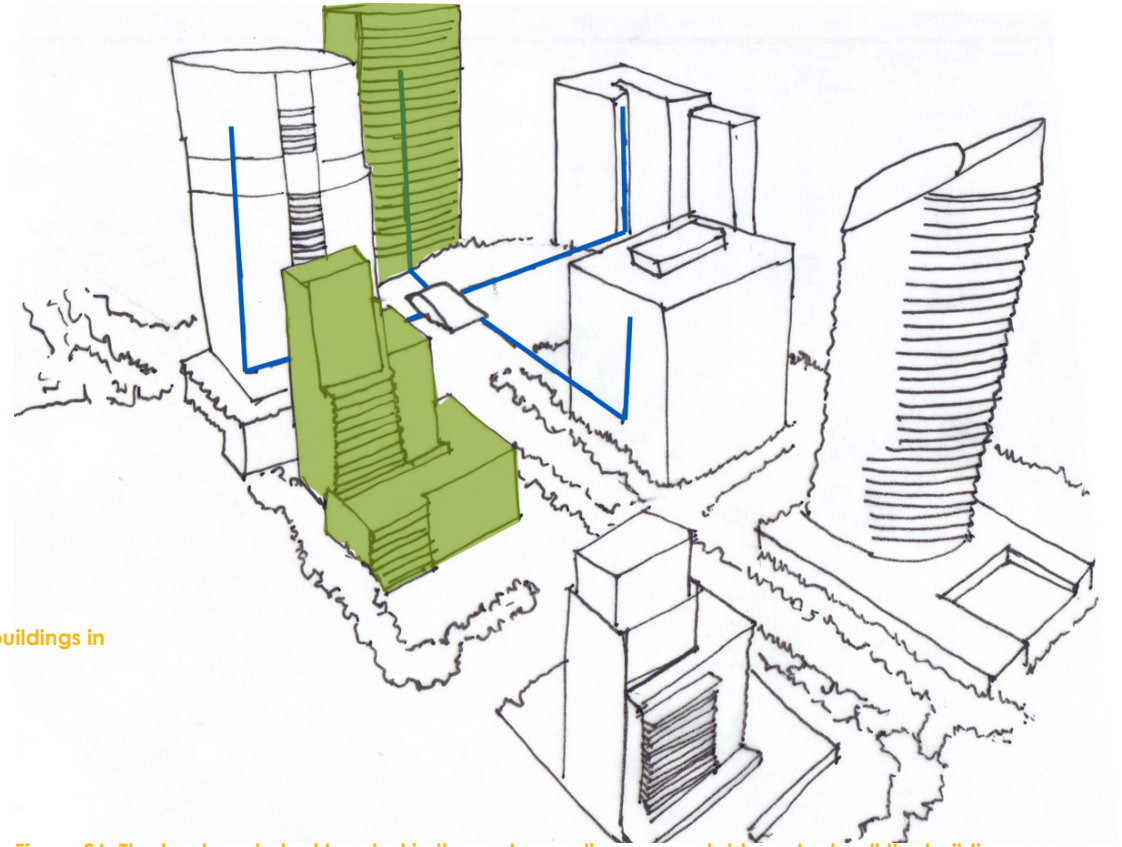


Figure 36: The treatment plant located in the park supplies non-portable water to all the buildings within the development. [Author]

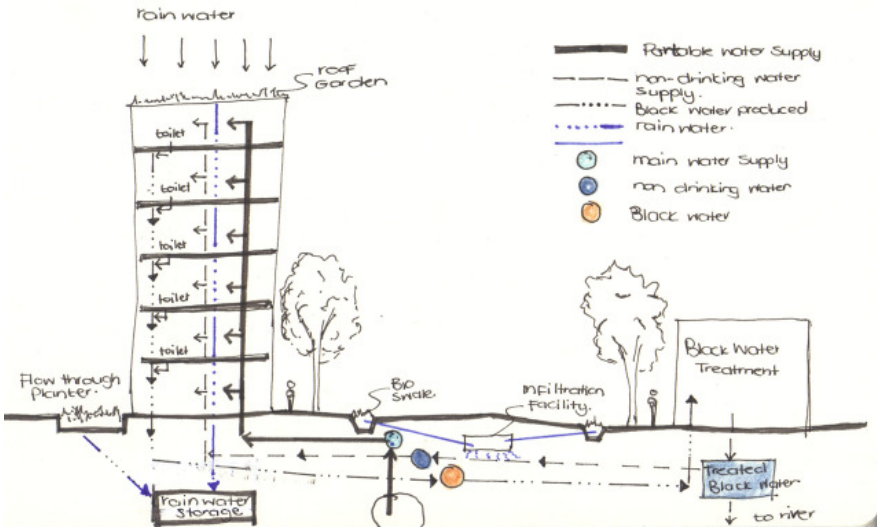


Figure 37: Black water from the municipal main is mined and treated then used non-portable uses. [Author]

A catalyst projects that demonstrate the economic feasibility of the development would be located on the site with each building catering for a different scenario. Building A will be a mid-rise, mixed use project with 150 residential units. Building will be a high-rise residential unit with between 240-300 units. (GreenWorks, nd)

The project has a park area which is located in the centre of the development. A black water treatment facility attached to a cafe creates a focal point on the park. The park is irrigated using water that has been reclaimed from the storm water and processed water from the black water treatment.

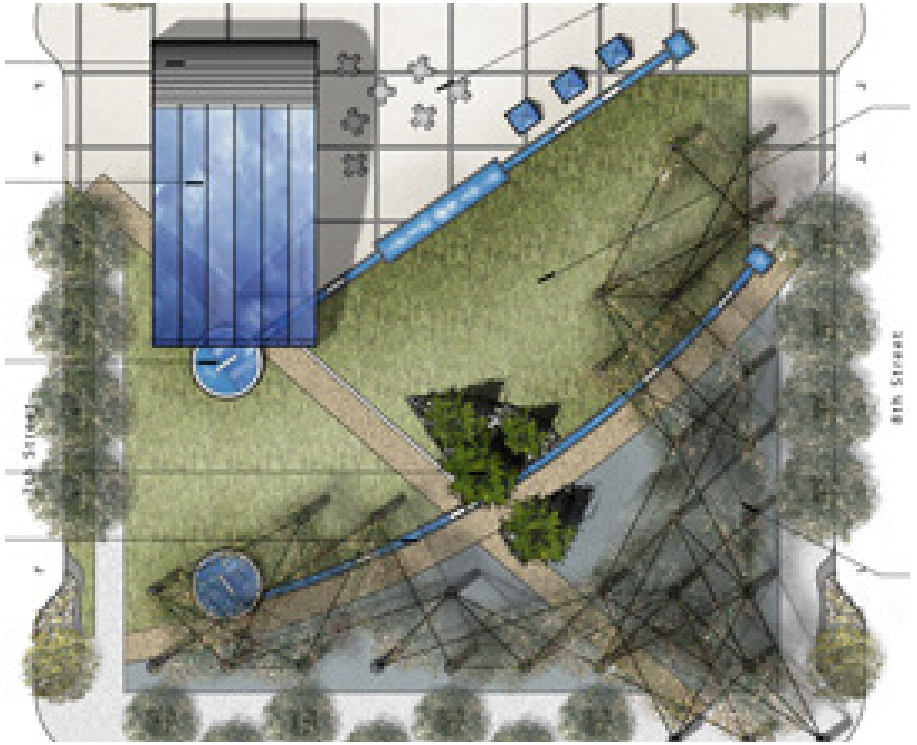


Figure 38: Plan of Lloyeds crossing perk area- [www.mithun.com : 2004]

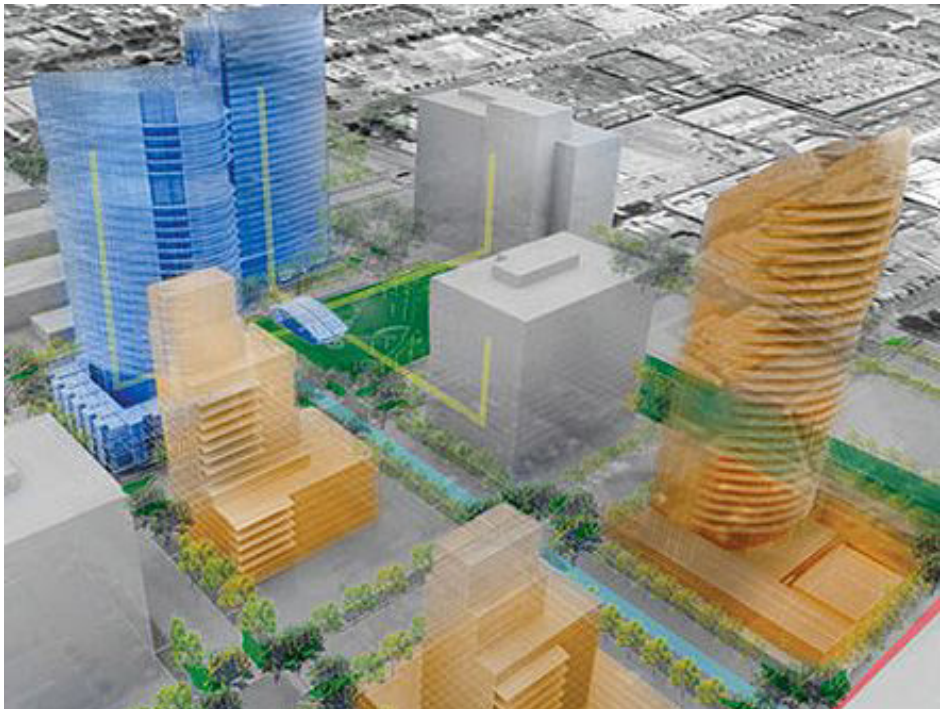


Figure 39: Areal view of the catalysts development- [www.mithun.com : 2004]

Recycled materials are used to cover the parks hard surfaces while the floors of the abstracted forest are covered with recycled glass that can be illuminated from beneath at night. Light wells provide lighting into the parking area which is located under the park.

Metal Recycling Plant -

Deklava Gregoric Architects

Figure 40: Metal Recycling Plant -[www.archdaily.com : 2011

The Metal recycling plant from architects Dekleva Gregoric is located in Pivka, Slovenia. Before the building was designed the question was asked: "what is long lasting and what is recycle friendly?" From that the ecovision for the building was born. The building is designed with the vision of being recyclable once it has reached its life span. Metal and concrete were chosen as the main construction material because of their ability to be easily recycled (Architures, 2011).

The facility mainly consists of two buildings of exactly the same form and size, one made of metal and one made of concrete. The use of the different materials is inspired by the process of separating the metals for the recycling process (Architures, 2011).

The control building is made of steel and covered in a metal screen. This building is also elevated above the sorting area so as to monitor and supervise the weighing as well as the incoming and out coming of the metals (Architures, 2011).

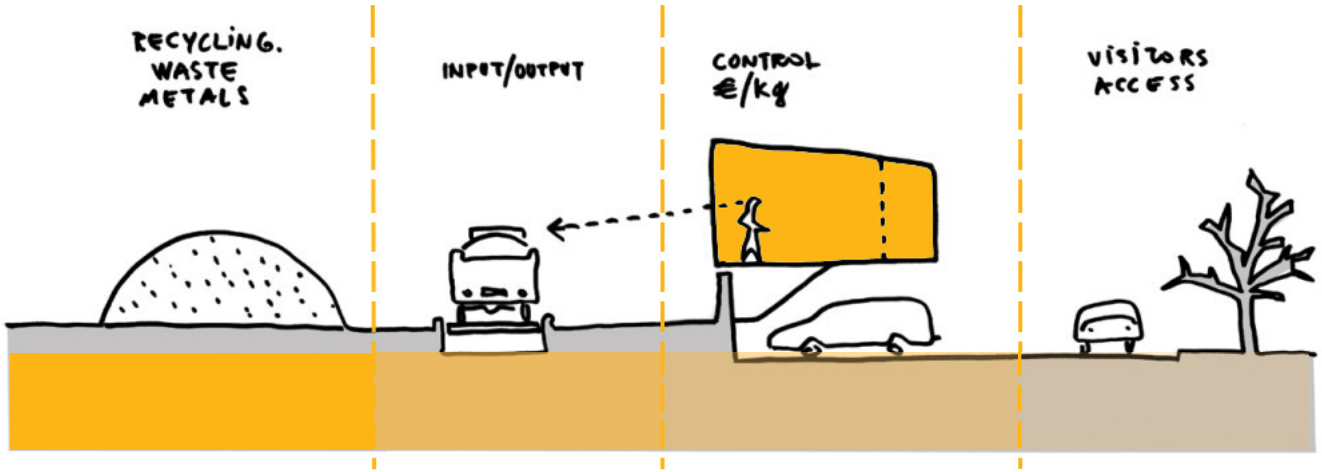


Figure 41: Edited by author

Each component of the recycling facility is clearly separated through a privacy gradient. Production line ----- input/output----- control ---- visitor's access.

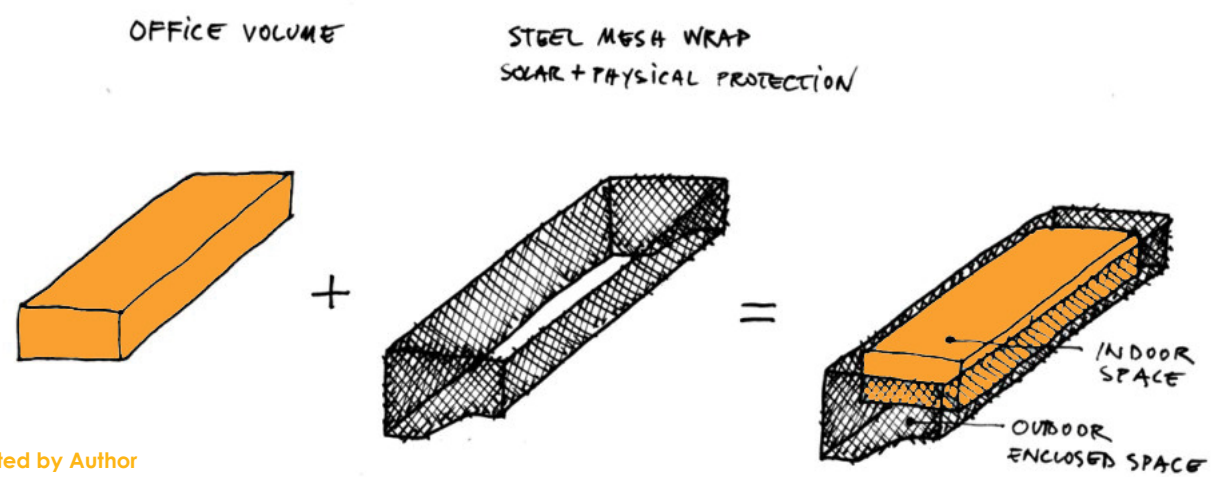


Figure 42: Edited by Author

The materials that have been used to construct the building make it easier to dismantle the building once its reached its life span.

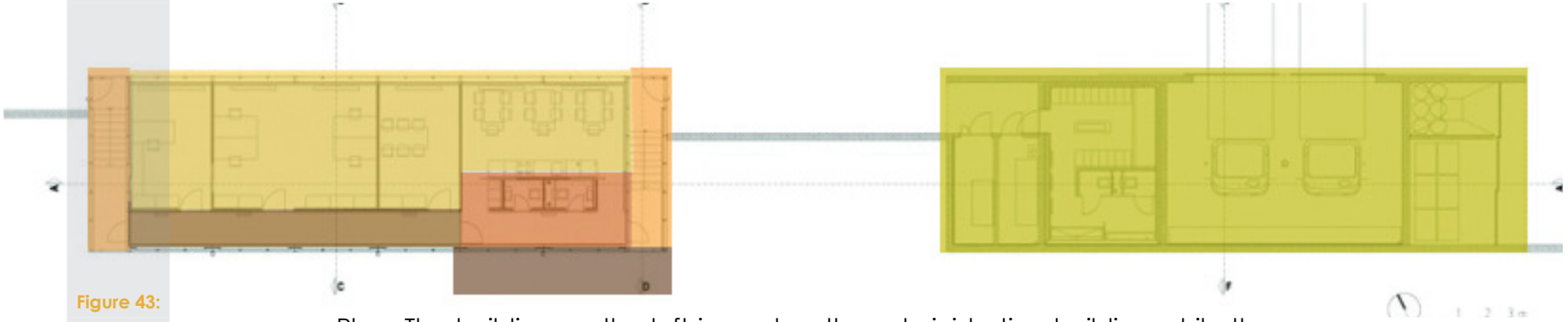


Figure 43:

Plan: The building on the left is used as the administration building while the one on the right is for services

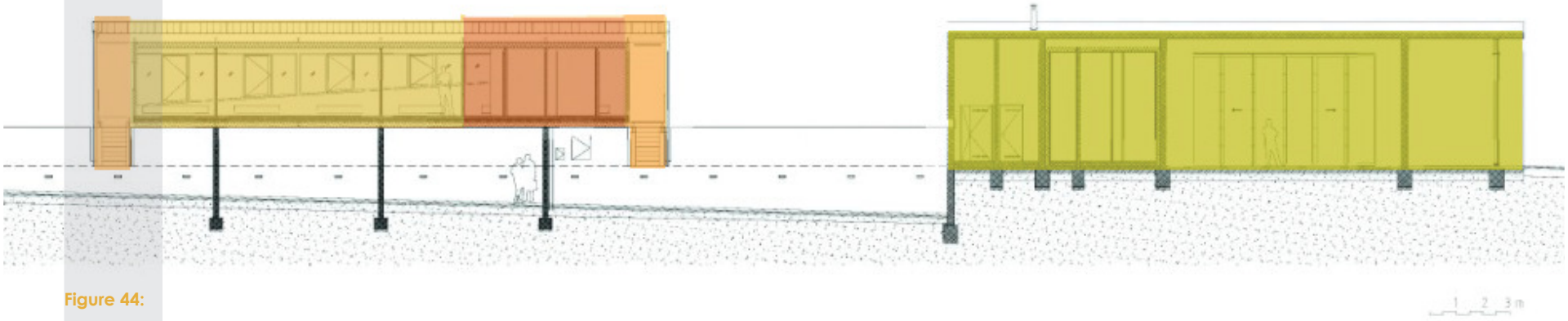


Figure 44:

- Services
- Dispatch
- Circulation
- Office space
- Corridor
- Front Administration

Figure 45: The two contrasting buildings one made of steel and the other made of concrete. [www.archdaily.com : 2011]

Maag Recycling Center -

Open Operating System Architect

Figure 46 The Maag recycling facility, located in Winterthur Zurich -[www.archidose.org: 2005]

The Maag recycling facility, located in Winterthur Zurich was a collaboration between Open Operating system and landscape architects Rotzler Krebs Partner. The facility was envisioned to be more than just a recycling facility from the conceptual stage (Archidose, 2005).

The facility's parking area, which is located on the roof, is painted in a bright green colour resembling an American football field. This green colour was chosen as it reduces the amount of heat that is radiated into the building and it also becomes a pleasant feature for the neighbours to look at (Archidose, 2005).

The building construction utilizes the use of a concrete structure wrapped with a steel mash. The mash shades all the interior spaces during the day but exposes them in the night. All the interior walls are painted green and large scale graphics are used to illustrate the workings of the building (Archidose, 2005).

The building is single story in height made up of four elements:

- The processing area
- Storage
- Services
- Administration offices

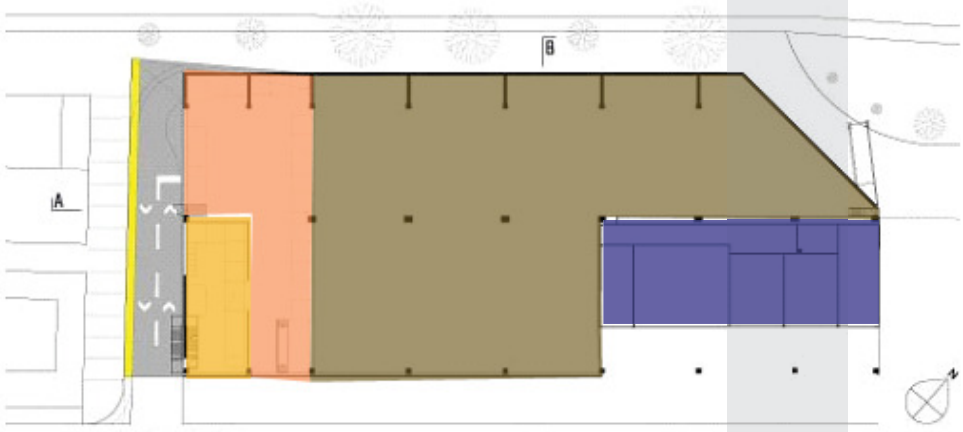


Figure 47: Ground Plan

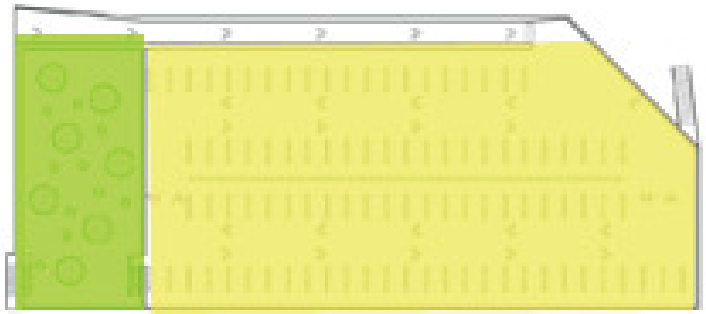


Figure 48: Roof Plan

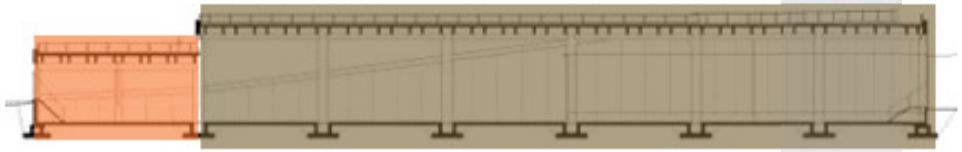


Figure 49: Section

- Park area
- Parking area

The roof area also has a small park area that acts as a breakaway space for the buildings employees and an amenity for the neighbours which makes the building more than just a recycling facility (Archidose, 2005).

Figure 50.1:

Figure 50.2:

Figure 50.3:

Figure 50.1: The dispatch area of the recycling centre.

Figure 50.2: The roof garden area with planted trees.

Figure 50.3: entrance leading to the roof Garden area.

[www.archidose.org/: 2005]

Valdemingomez Recycling Plant

Abalos & Herreros

Figure 51: The Valdemingomez recycling plant from the architects Abalos and Herreros-[www.herrerosarquitectos.com : nd]

The Valdemingomez recycling plant from the architects Abalos and Herreros is situated in the Valdemingomez area of Madrid, Spain. The architectural team is known for their designs that reveal societies consumer culture in an effort to promote waste education and recycling (Herrerosarquitectos, n.d). The Valdemingomez recycling plant is part of a group project that aims to create a system of waste treatment and recycling while also transforming the area to achieve the region's future goal of rehabilitating the area. The facility is built on an area that used to be a dump and therefore had a stigma attached to it and was associated with all the negative aspects of a consumer oriented urban area (Herrerosarquitectos, n.d).

Figure 52: The production line linking the 3 buildings together-[www.herrerosarquitectos.com : nd]

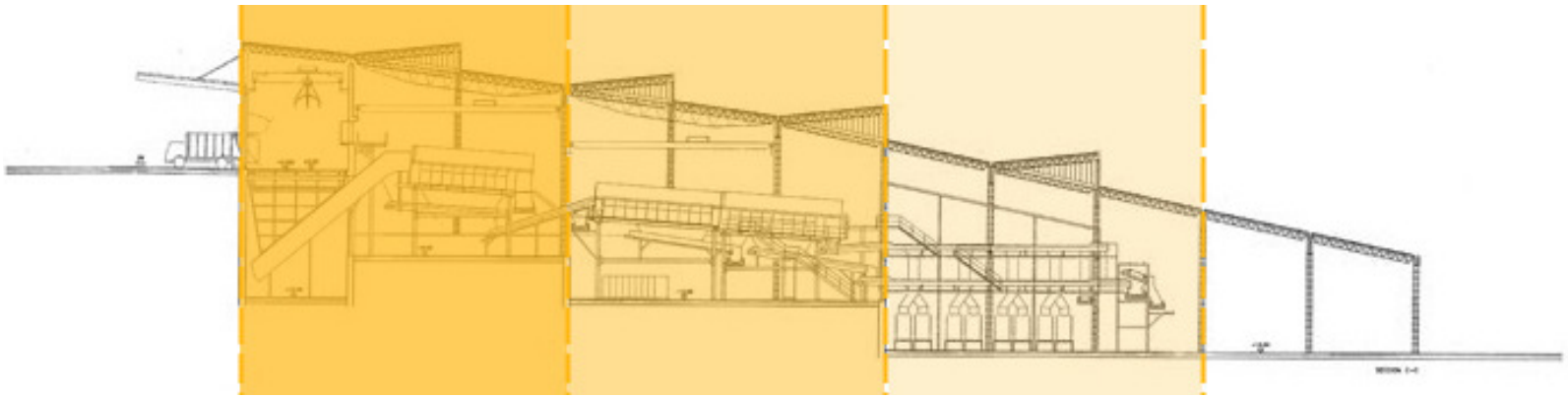
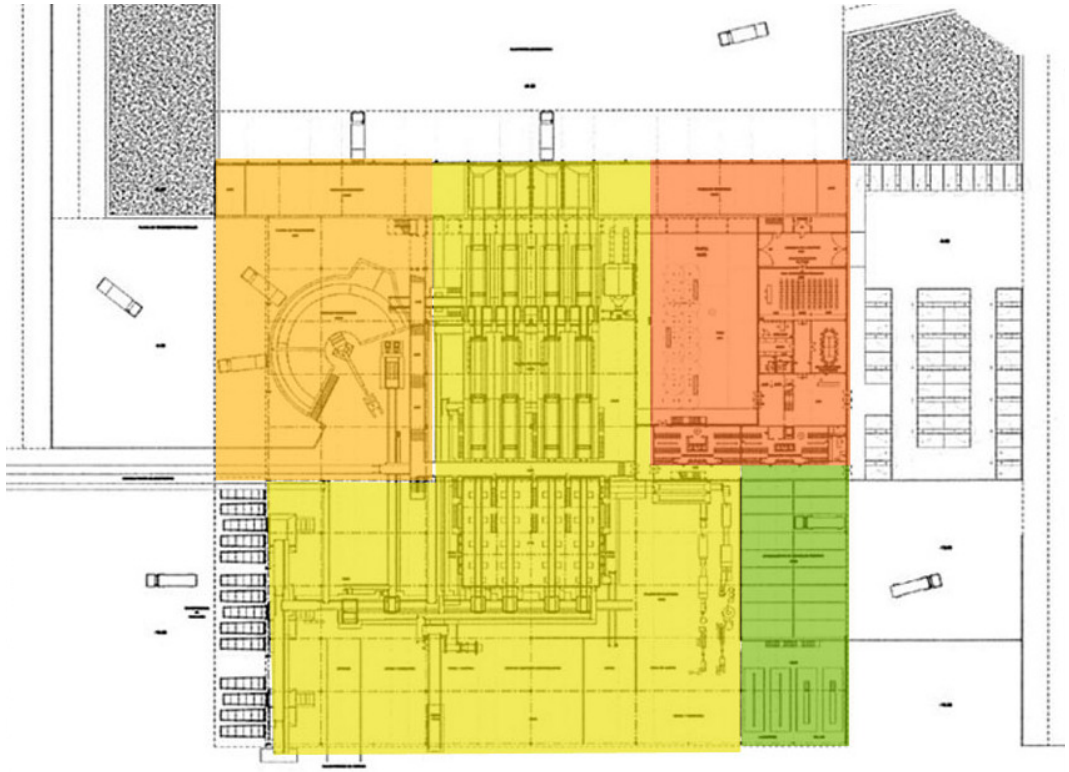


Figure 53: The 3 buildings The Valdemingomez recycling plant together-[Edited by author]

The centre consists of 3 buildings: a reception and weighing pavilion, the recycling, compost production and the refining plant, all covered under a green roof. All three of these buildings are different in size, organisation and form because of their different functions but are all linked by the coherent recycling plant. The architect said "the roof echoes the gravitational character of the processes it does with the original hillside upon which it sits." (Herrerosarquitectos, n.d)



The buildings programme includes processing and treatment facilities, offices, workshops and storage space. There is also a museum incorporated and a visitor's route includes watching the recycling process. The facility tries to educate the public by putting itself on display. The poly carbonate walls allows one to be able to see the workings of the building (Herrerosarquitectos, n.d).

- Delivery and weighing
- Processing area
- Dispatch
- Administration and office space

After the waste materials are dropped off into the recycling machine, the production line process is mainly driven by gravity which means less energy is used.

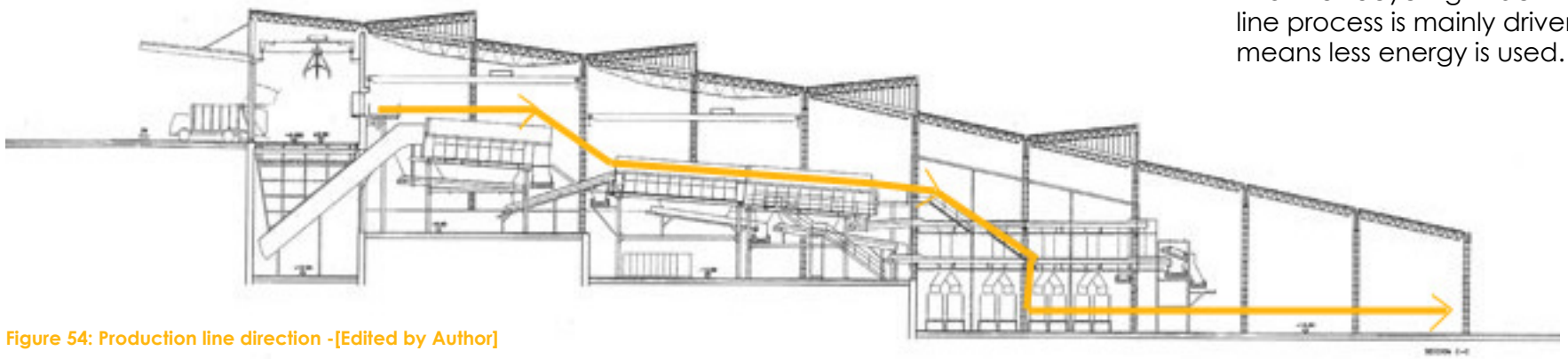


Figure 54: Production line direction -[Edited by Author]

Figure 55: 1

Figure 55: 2

Figure 55: 3

Figure 55: The recycling process is visible through the poly- carbonate walls allowing them to also become part of the display.
[www.herrerosarquitectos.com : nd]

Pompidou Center -

Renzo Piano and Richard Rogers

Figure 56: Pompidou Center . [www.jantroost.eu :nd]

The Pompidou centre, designed by Renzo Piano and Richard Rogers is considered one of the most radical buildings of the time. The French president; Georges Pompidou; wanted to construct a cultural centre in Paris that would attract visitors and be a monumental aspect of the city. The centre was also meant to be completely focused on modern and contemporary creation where people could network (Powell, 2001).

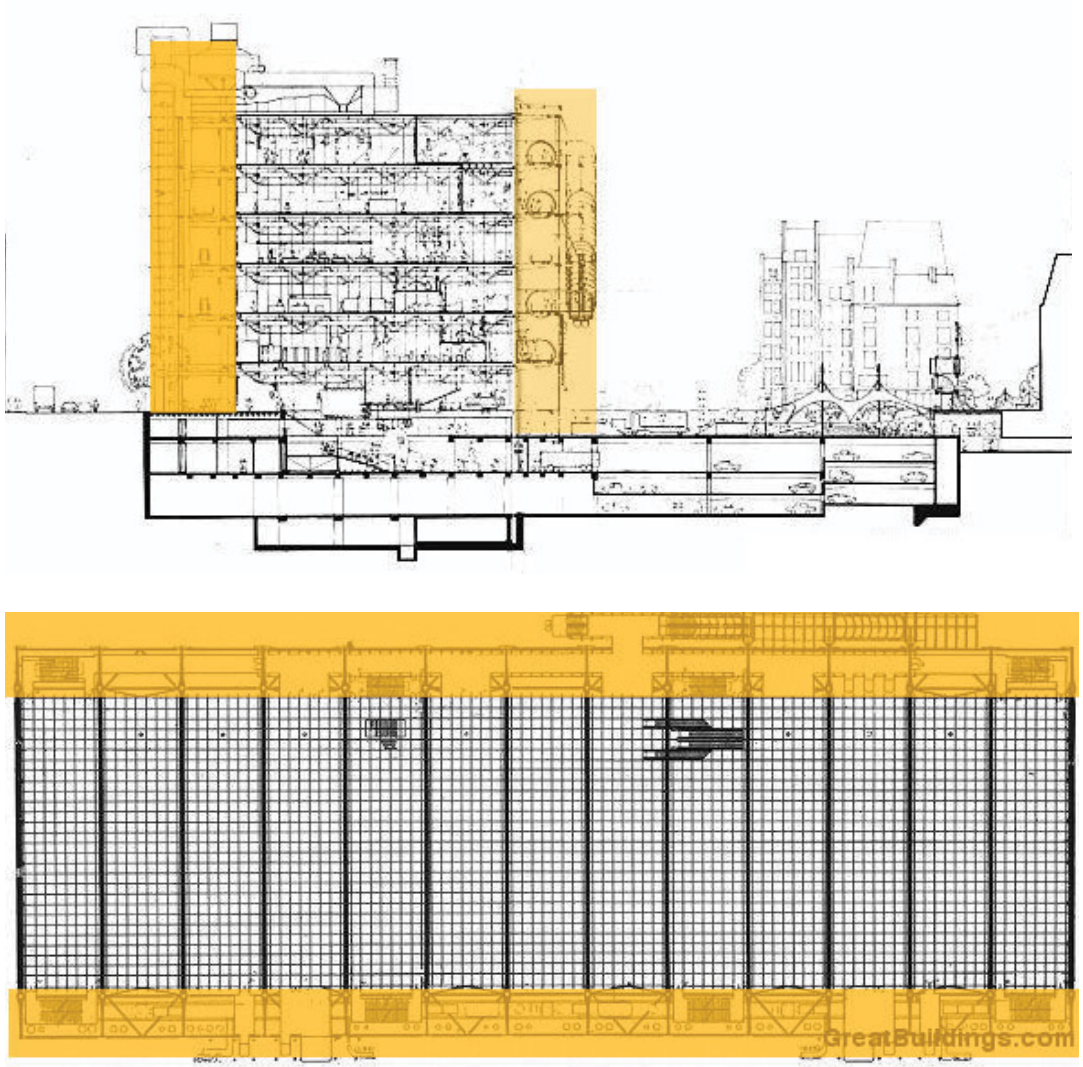


Figure 58: Section and Plan. The buildings services and circulation located on the buildings edge. [Edited by Author]

Figure 57: services are expressed on the decade by also colour coding them - [www.sitebits.com : 2008]

The high tech building which is in contrast with some of Paris' buildings like the Notre- Dame cathedral and the Louvre museum, houses a number of different functions that include a public library, a museum and a music centre. One of the more striking features of the building is the exposed skeleton of the building. All the exposed buildings services are painted in bright colours and located on the buildings periphery. All the services are concentrated on the east facade while all the circulation is concentrated on the piazza façade (Powell, 2001)

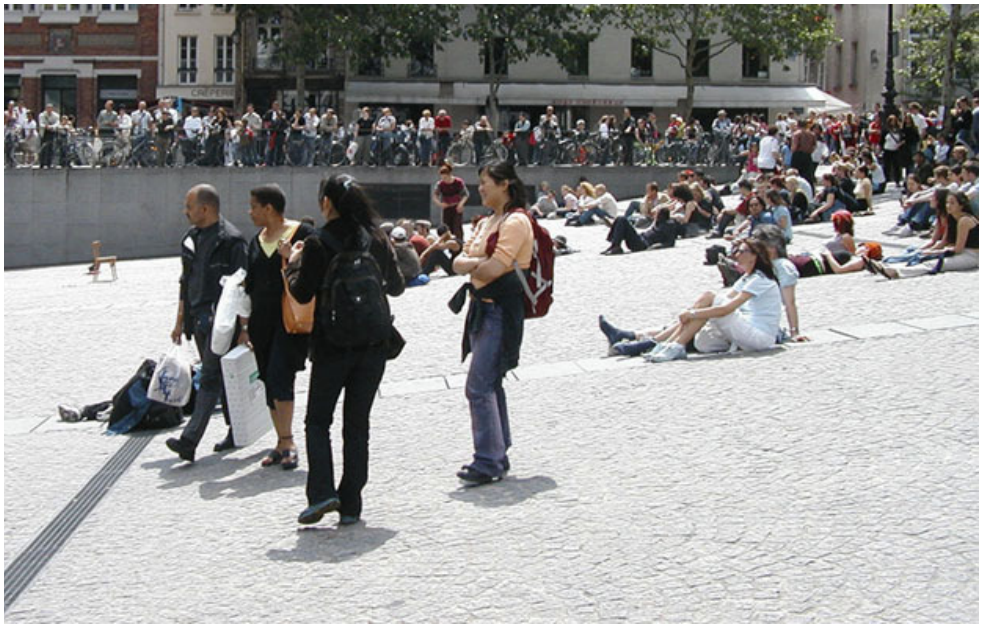
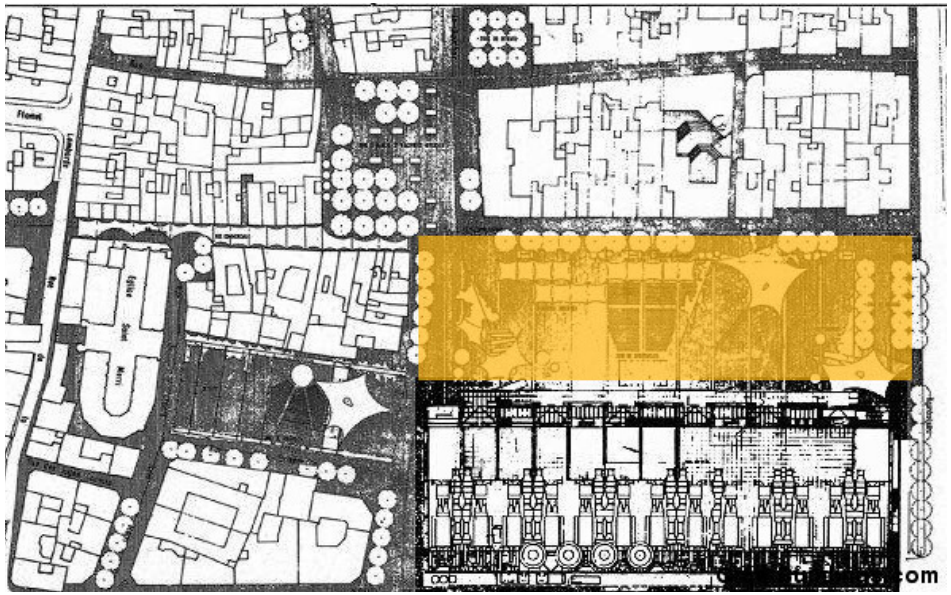


Figure 59: Front part of the building is left as public space to be used for public events like performances and exhibitions. -[www.utexas.edu: nd]



One of the vital elements to the scheme was the introduction of a public space which has now become one of the most significant spaces in the heart of Paris. Half of the site was left open in order to accommodate the square which would be used for a variety of public events like markets; exhibitions and performances. (Powell, 2001).

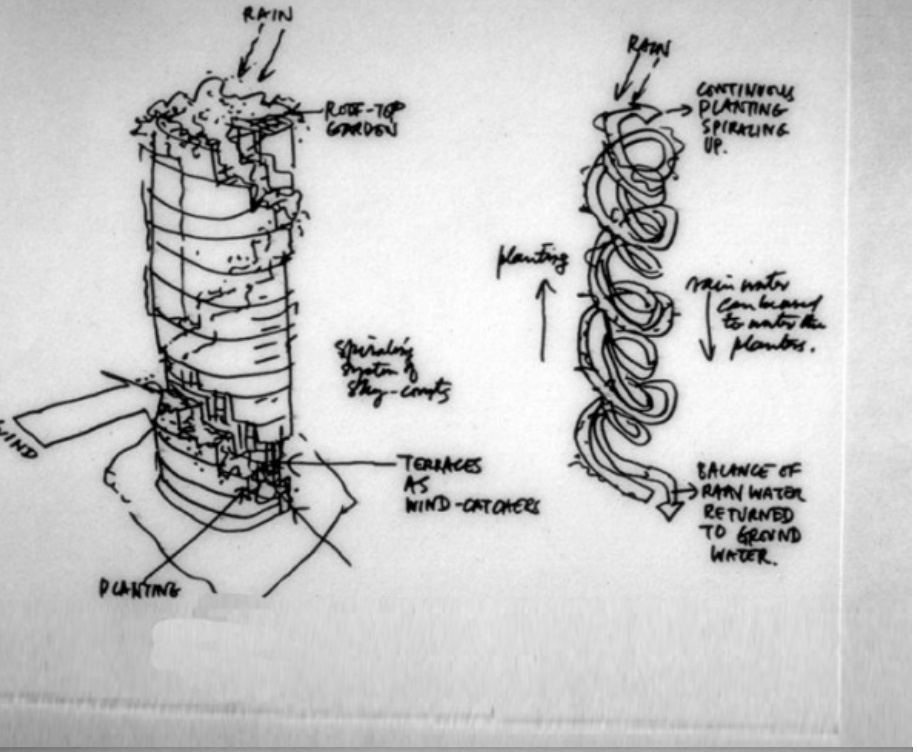
Menara Mesiniaga

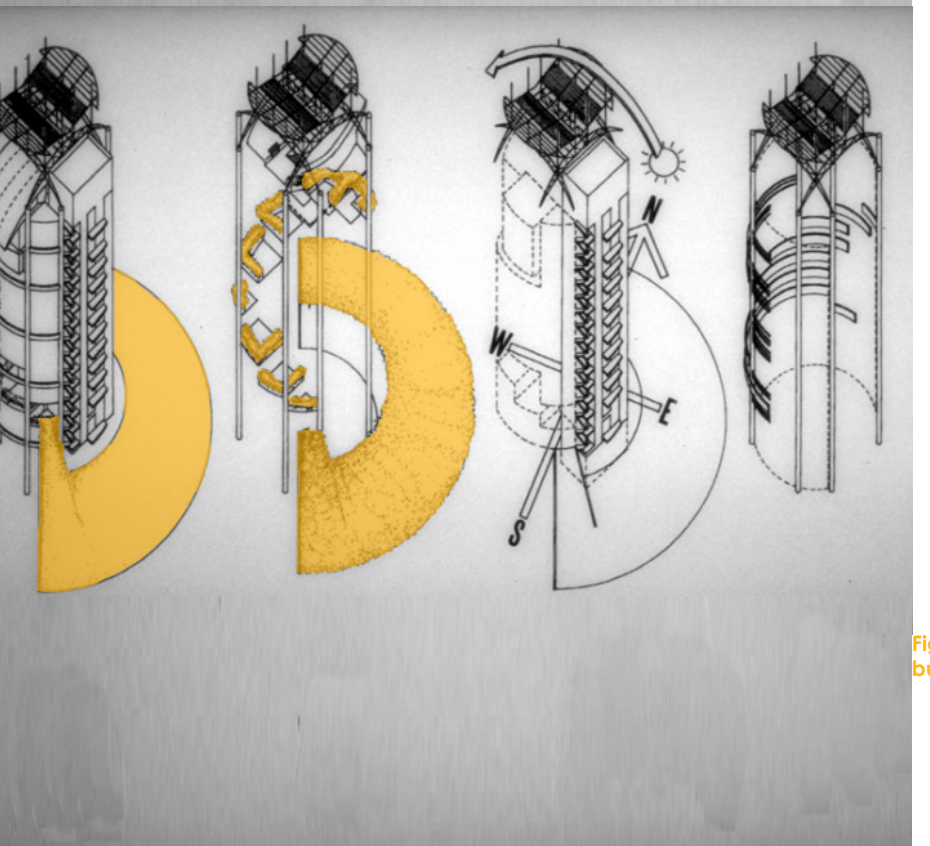
Hamzah & Yeang Architects

The Menara Mesiniaga building is the headquarters for IBM in Subang Jaya, Kuala Lumpur built in 1992 by architect Ken Yeang. The high- tech building exemplifies some of Ken Yeang's practices and principals of a bioclimatic skyscraper of which he describes as a design method that seeks to create a low energy, passive building that provides better occupancy comfort (Yeang, 2006).

The 15 storey building incorporates the modern day office building with a clear sensitivity towards its environment and issues like natural lighting and ventilation. The surrounding area around the site has lush unplanned landscaping and the building also takes advantage of this natural environment by also incorporating it into its functioning (Walczaki, nd)

Figure 60: Menara Mesiniaga building in Kuala Lumpur- [www.skyscrapercity.com : 2009]





The fifteen storey building is designed with three main concepts in mind. 1. A sloping landscape at the ground level that connects with the building. 2. Vertically spiraling landscapes that include sky courts and 3. Swimming and gym areas that are provided on the upper floors (Walczaki, nd).

The spiraling landscape is created by the stepped balconies which creates an illusion of a continuous green system. The system not only creates pausing and interacting spaces within the building but also acts as a shading device, helps in cooling the spaces in the building down and in noisy areas helps to absorb some of the noise. (Yeang, 2006)

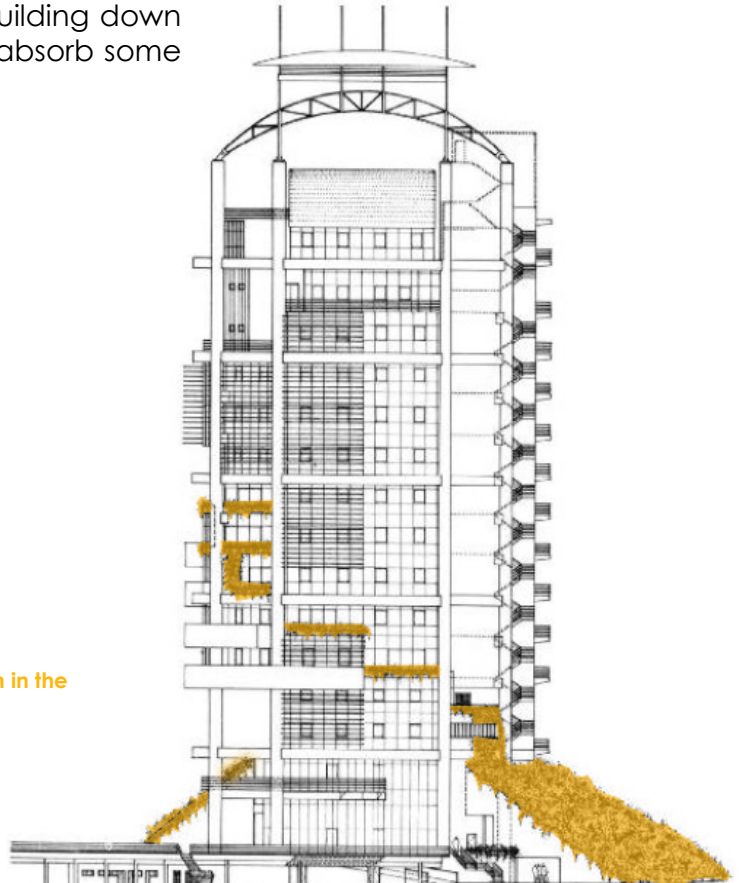
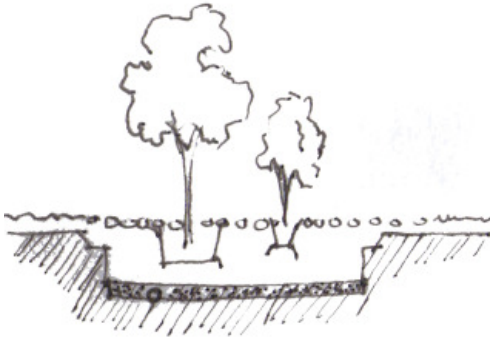


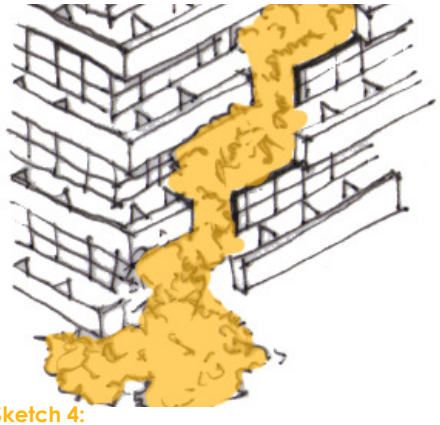
Figure 61: Conceptual drawing of the green system in the building- [www.yangsquare.com : nd)



Sketch 1:

Sketch 2:

Sketch 3:



Sketch 4:

Traditionally landscape planting is laid horizontally. In the case of tall buildings a more vertical approach is necessary. The landscaping can simply be plants and other organic materials that have been integrated vertically into a building. (Yeang, 2006)

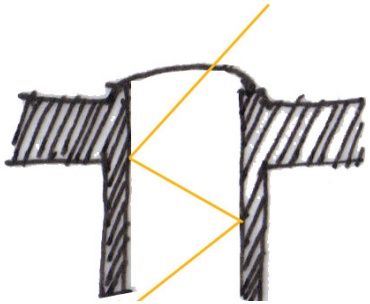
When constructing vertical landscapes a number of factors should be considered.

1. Structural loading: successful planters can be created with as little as 600mm of soil and can hold up trees of up to 5 meters in height. (Yeang, 2006)

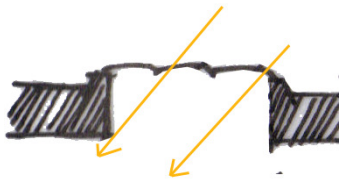
2. Natural lighting: Direct day light is more encouraged as a primary source of light. Limitations of sky lights and glazing should be realized in terms of the amount of light intensity that would fall on the plants. (Yeang, 2006)

3. Planting Irrigation: Irrigation is very important to the vertical landscaping because of the limited soil depths. The supply of water and nutrients has to be constant to prevent the plants from drying out and dying. A mechanical gravity- fed drip system can be used with sprinkler heads laid inside a planter box to feed water and fertilizers to the plant at specified times of the day. (Yeang, 2006)

4. Planter Drainage: drainage of excess water after watering the plants is important whether the plants are movable of floor type planters. Drain lines should be laid in a gravel layer separate from the support soil. (Yeang, 2006)



Sketch 5:



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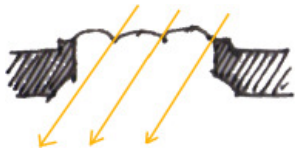
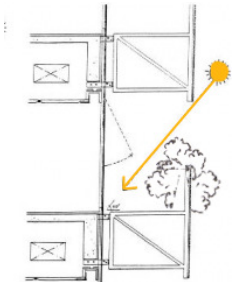


Sketch 7:



Sketch 8:

Part 3

Site Selection

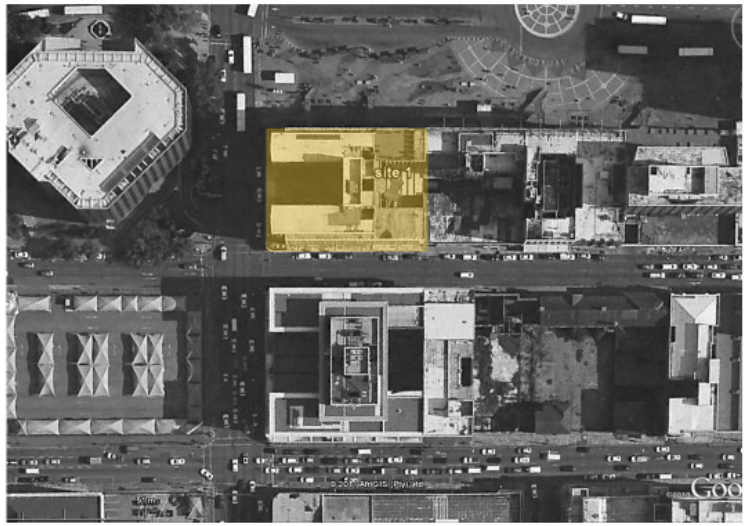
SITE SELECTION

When choosing the site for the centre a number of requirements had to be met. The site had to be a brown field site to continue with the theme of recycling this way the building is also recycled. The site has to be in close proximity with the waste source. A lot of waste is generated within the Johannesburg CBD and this would therefore be an appropriate area for the centre. As one of the functions of the centre is to create awareness, the site has to be in a publically visible area.

Eight possible sites were analysed according to the criteria and eliminated accordingly in the end site no 7 was chosen as it met all the requirements.

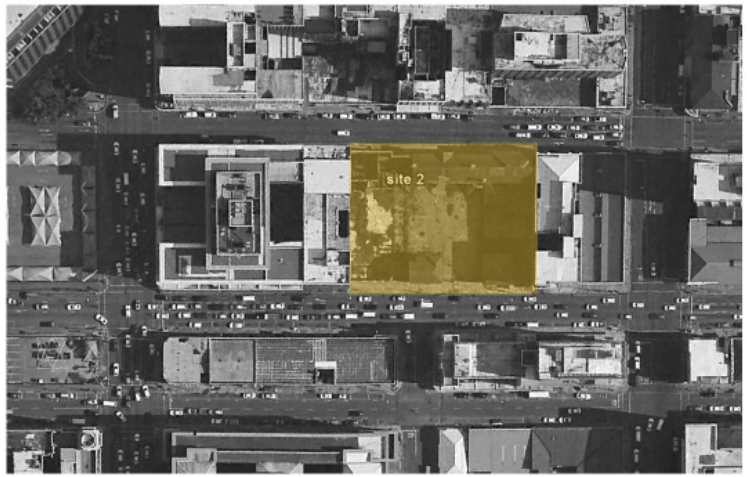
Figure 62: Possible sites which were considered all located with in the Johannesburg CBD [Google maps; 2011]

SITE 1



- Site in close proximity to the waste source (Johannesburg town centre).
- Should be pedestrian friendly: for the cart pushers.
- Minimum size of 1250 sqm.
- Site has public visibility: to continue with the theme of propaganda and to create a public awareness of waste. ☆☆☆
- Central to the other recycling area: to create more economic opportunity for the cart pushers.

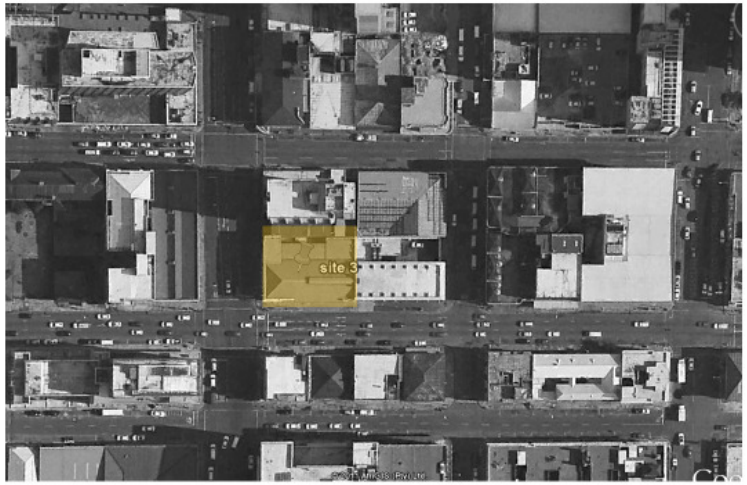
SITE 2



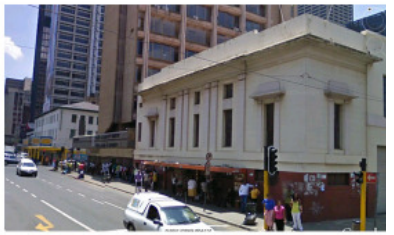
- Site in close proximity to the waste source (Johannesburg town centre).
- Site is brown field: to continue with the theme of recycling the city.
- Should be pedestrian friendly: for the cart pushers.
- Minimum size of 1500sqm.
- Central to the other recycling area: to create more economic opportunity for the cart pushers.

(site bounden on one side by vehicular movement - private cars)

SITE 3



- Site in close proximity to the waste source (Johannesburg town centre).
- Site is brown field: to continue with the theme of re-cycling the city.
- Site is pedestrian friendly: for the cart pushers.
- Site has public visibility: to continue with the theme of propaganda and to create a public awareness of waste. ☆
- Central to the other recycling area: to create more economic opportunity for the cart pushers.



SITE 4

- Site in close proximity to the waste source (Johannesburg town centre).
- Site is brown field: to continue with the theme of re-cycling the city.
- Site is pedestrian friendly: for the cart pushers.
- Minimum size of 1500sqm.
- Central to the other recycling area: to create more economic opportunity for the cart pushers.

SITE 5

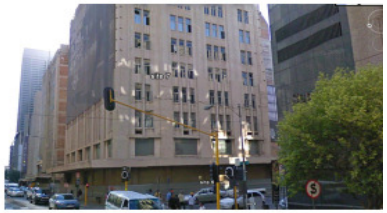
- Site in close proximity to the waste source (Johannesburg town centre).
- Site is pedestrian friendly: for the cart pushers.
- Minimum size of 1500sqm.
- Central to the other recycling area: to create more economic opportunity for the cart pushers.

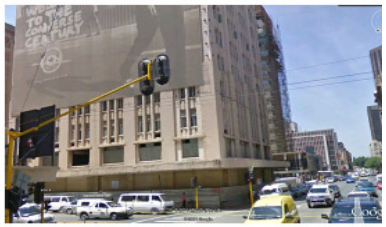
SITE 6

- Site in close proximity to the waste source (Johannesburg town centre).
- Site is brown field: to continue with the theme of re-cycling the city.
- Site is pedestrian friendly: for the cart pushers.
- Central to the other recycling area: to create more economic opportunity for the cart pushers.

SITE 7

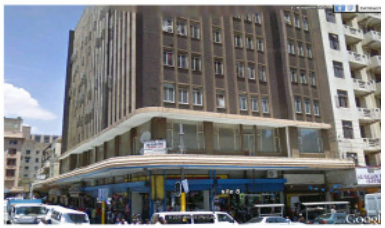
- Site in close proximity to the waste source (Johannesburg town centre).
- Site is brown field: to continue with the theme of re-cycling the city.
- Minimum size of 1500sqm.
- Site has public visibility: to continue with the theme of propaganda and to create a public awareness of waste. ☆☆☆
- Central to the other recycling area: to create more economic opportunity for the cart pushers.





SITE 8

- Site in close proximity to the waste source (Johannesburg town centre).
- Brown field site: to continue with the theme of recy-cling the city.
- Should be pedestrian friendly: for the cart pushers.
- Minimum size of 1500sqm.



multiple product recyclers

Pikitup waste management

green house project

Site

single product

Industries in the CBD relating to the recycling centre were mapped out and it became apparent that most of these centres are located on the cities edge. To bring awareness the center would have to be brought into the inner city where people would be constantly made aware of their waste.

As this project stemmed from asking questions about nature, the mapping od green spaces in the city center became important.

The Johannesburg city is densely built and occupied by a large of people working and living in the CDB.

The building will not only cater to people using vehicles but will also cater to pedestrian whether it is people living in the area, people working in the area or the informal waste recycles; cart pushers. It is important that there are streets in the area that are more pedestrian friendly. The map above demonstrates the streets close to the chosen site that are pedestrian friendly.

The chosen site is located in the CBD, on the corner of Commissioner and Rissik Street. The neglected 10 storey art deco building; formally known as the old CNA building (Central News Agent); belonged to Old Mutual but was later sold to the property development company, Urban Oceans who intend to convert it into residential apartments. I have chosen to use this existing building as well as the strip of empty land besides the building.

This site was chosen because it fit the criteria that were discussed at the beginning of the chapter. In order for this building to be able to persuade, educate and raise awareness (a propaganda building), this sites close proximity to the civic precinct is a bonus.

The buildings construction utilizes a concrete framed structure with brick in fill has an area of under 1500 sqm. Because I will be using an existing building with an existing structure, it will be difficult to accommodate parking on the site. However, I intension is to use the parking area which is currently being constructed under Ghandi square.

Figure 63: Neglected building with its windows broken. [Author]

Prominent sites that are located close to the site

1: Library Gardens
2: City Hall
3: Old Post Office
4: Ghandi Square
5: Calton Centre

Heritage sites that are located close to the site

Transport routes close to the site

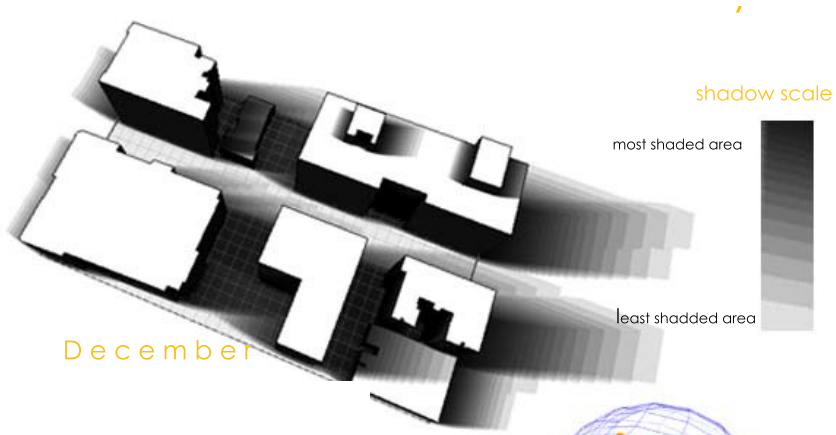
1. BRT bus route running north south
2. BRT bus station
3. Metro bus route
4. BRT bus route running east west

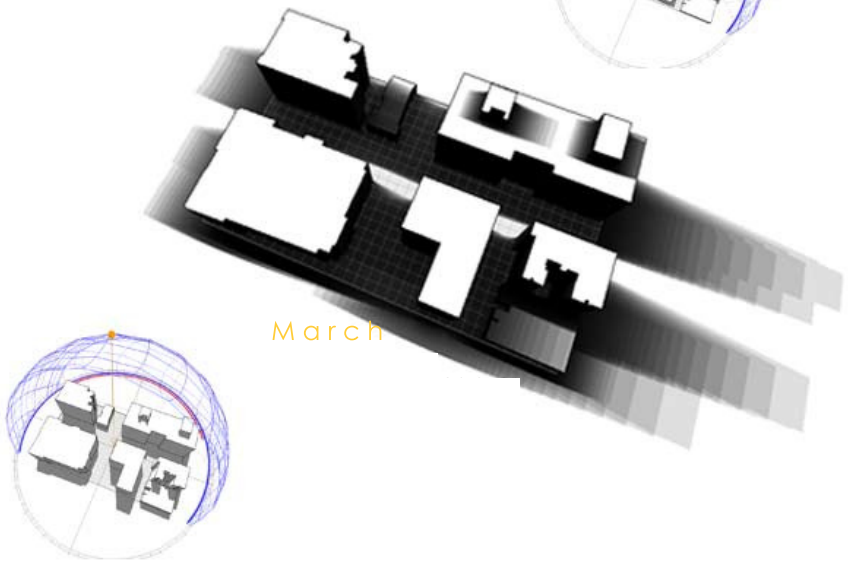
Pedestrian movement close to the site

Slow pedestrian movement

Rapid/ fast pedestrian movement

SHADOW ANALYSES





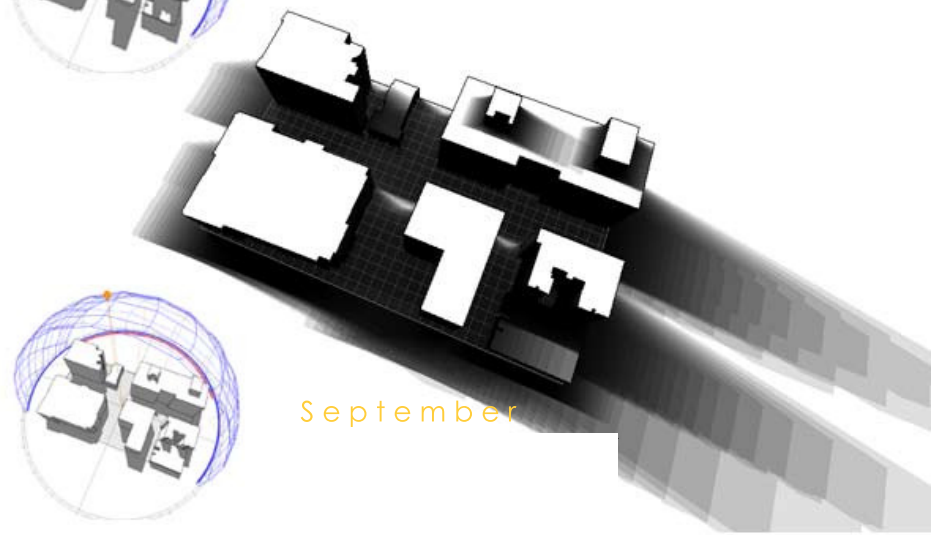


Figure 64:

The old entrance to the building is currently locked off and all the other openings of the building on the ground and first floor have been sealed by the buildings current owners so as to prevent the building from being occupied by homeless people.

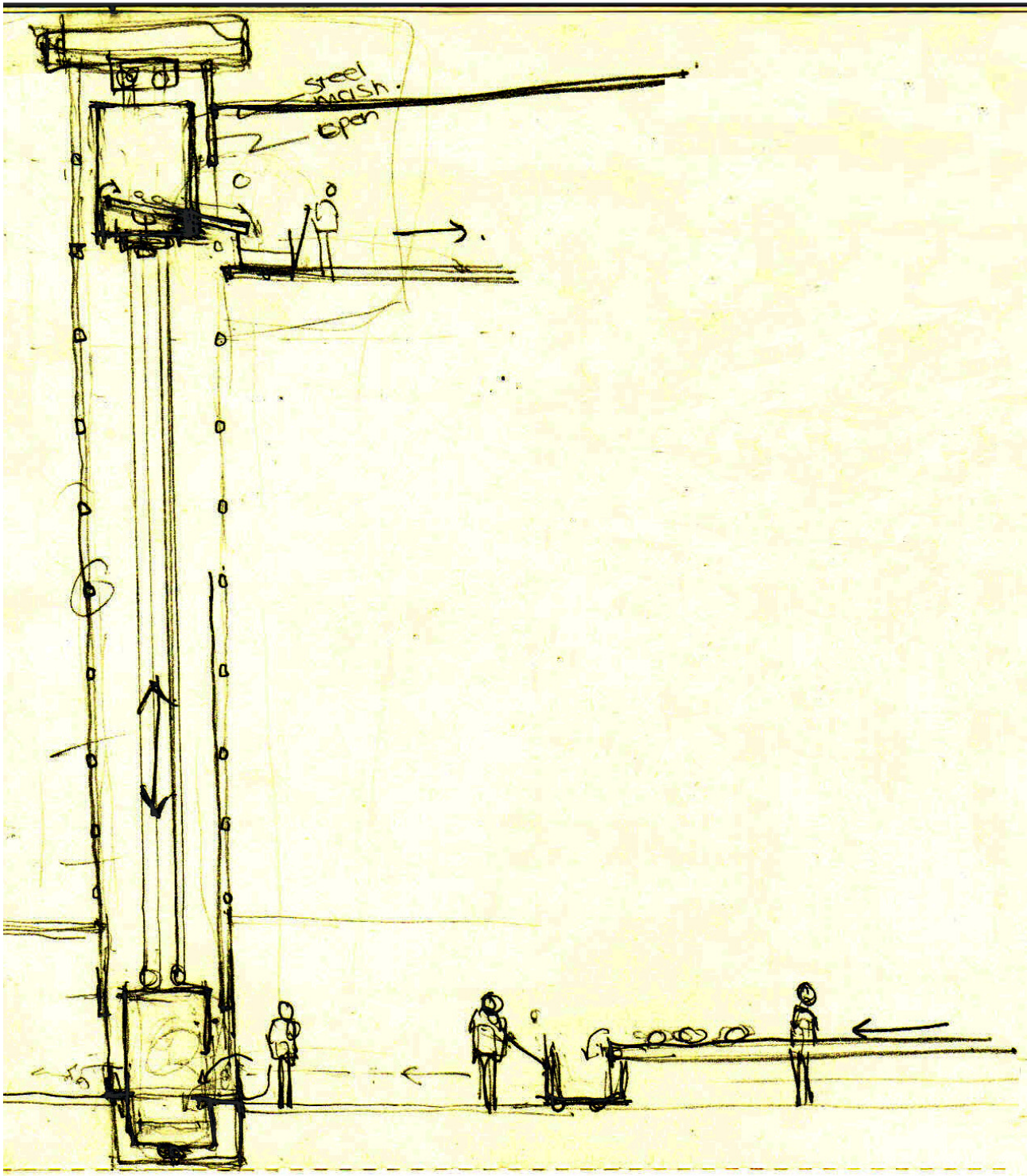
Figure 64: South West street View of the site.

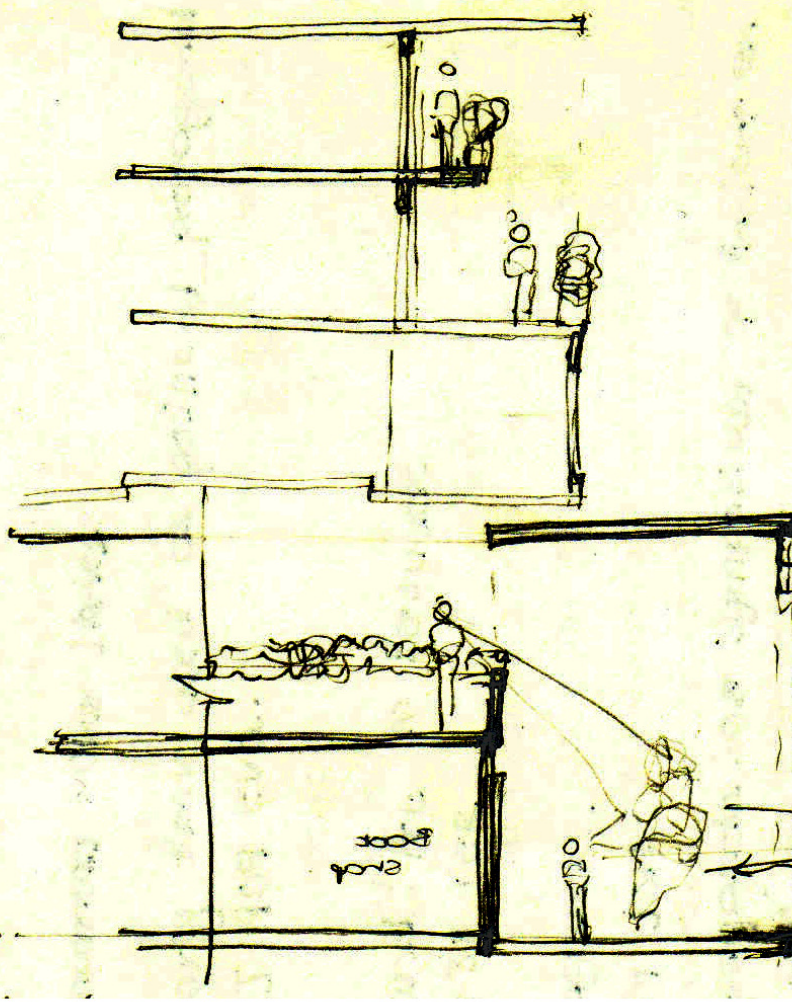
Figure 65: The blocked off old entrance to the building. [Author]

Figure 65:

Part 4

Design development


steel
mesh
open

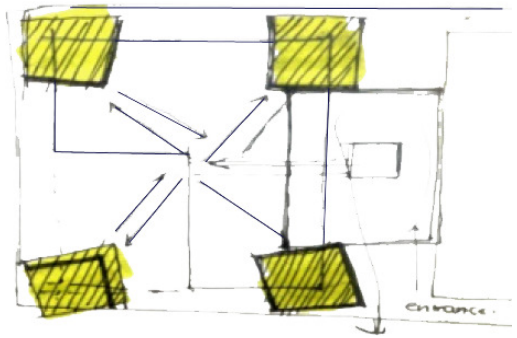


CONCEPTUAL SKETCHES

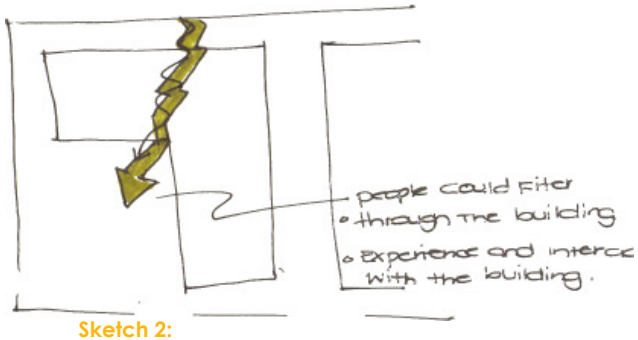
The following are some of the initial conceptual exploratory sketches for the project. The two main corners of the site; Rissik and Commissioner, and Fox and Rissik; are hot zones of activity which creating a great opportunity to show case and exhibit the building. The idea here is to place the recycling lift towers at these corners where they are exposed and visible to the public.

The open land on the southern side of the site would be left open to create a public open square and also to expose some of the systems that would be used in the building. This building aims to not only be visible to the public, but to also to encourage the public to interact with it. A cut through walk way on the northern part of the site would encourage people to walk through and interact with the building.

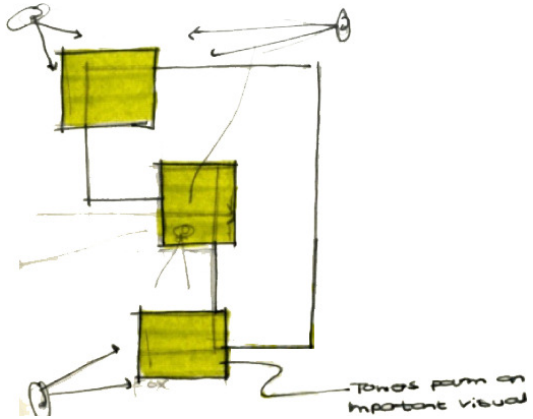
The long narrow open portion of land on the eastern side of the site gives an opportunity for the positioning of the recycling dispatch and drop-off. The shape of this portion subject a linear; north to south; movement of either vehicles or pedestrians.



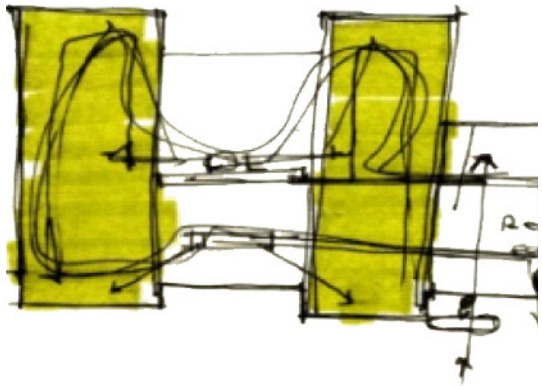
Sketch 1:



Sketch 2:



Sketch 3:



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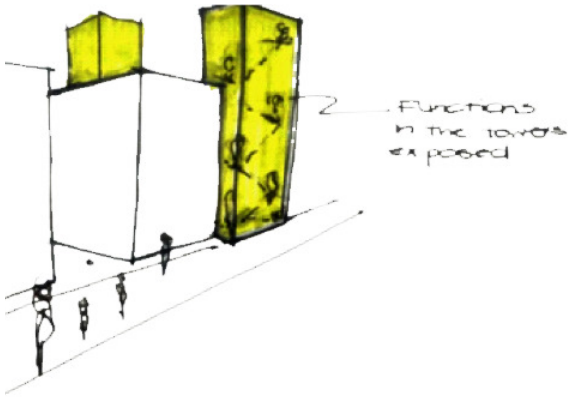
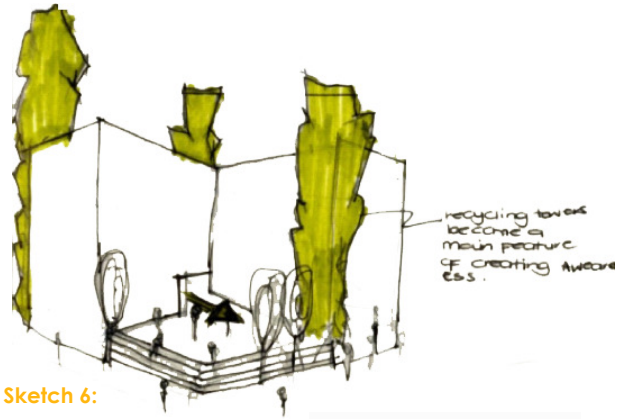
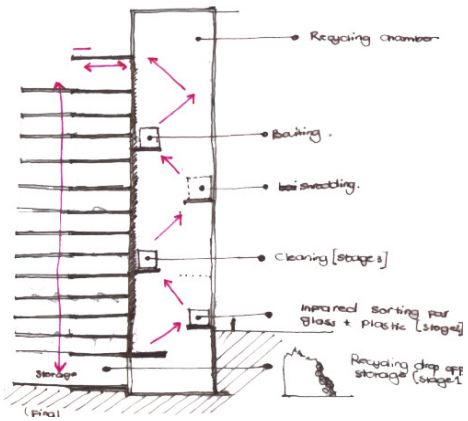


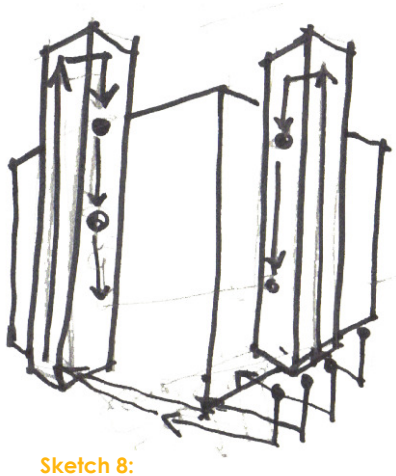
Sketch 5:



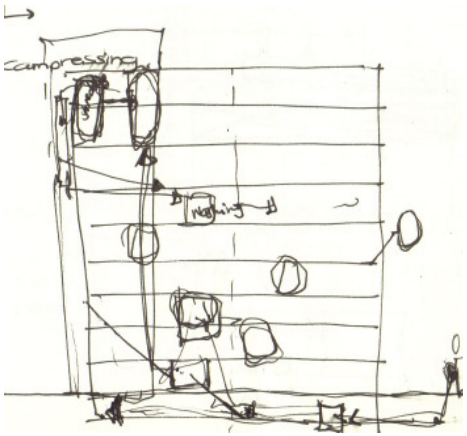
Sketch 6:



Sketch 7:

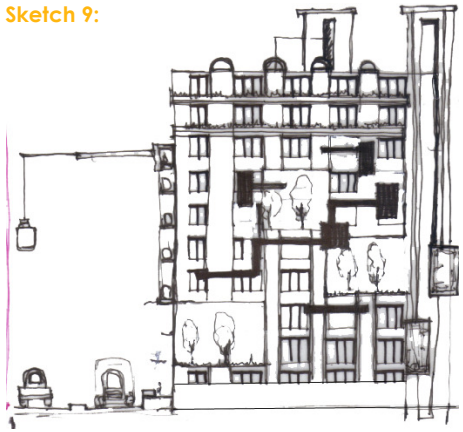


Sketch 8:



Sketch 9:

Sketch 10:



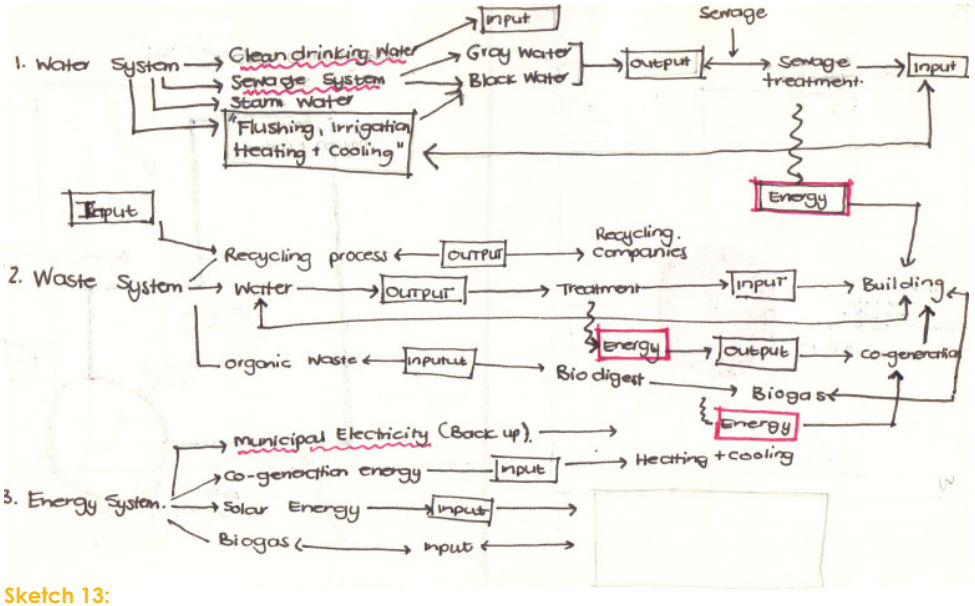
Sketch 11:

Sketch 12:

Further sketches were drawn exploring the recycling and green systems in the building. Sketch 7 was one of the very early sketches exploring how the recycling process would work in the towers although this was further developed in sketch 8 and 9. In sketch 8 the tower is only used as a lift for the recyclables and the rest of the recycling process occurs throughout the building (sketch 9) and sometimes even on the elevations.

Another system that was explored and would be further developed in the next chapter is that of the green spaces. The idea is to create green pockets within the building in the form of internal courtyard spaces and green balconies. (Sketches 10, 11, 12)

Sketch 13 looks at the main systems in a building (water, waste, energy) in terms of inputs and outputs and looks for opportunities where outputs can be used as inputs in another system.

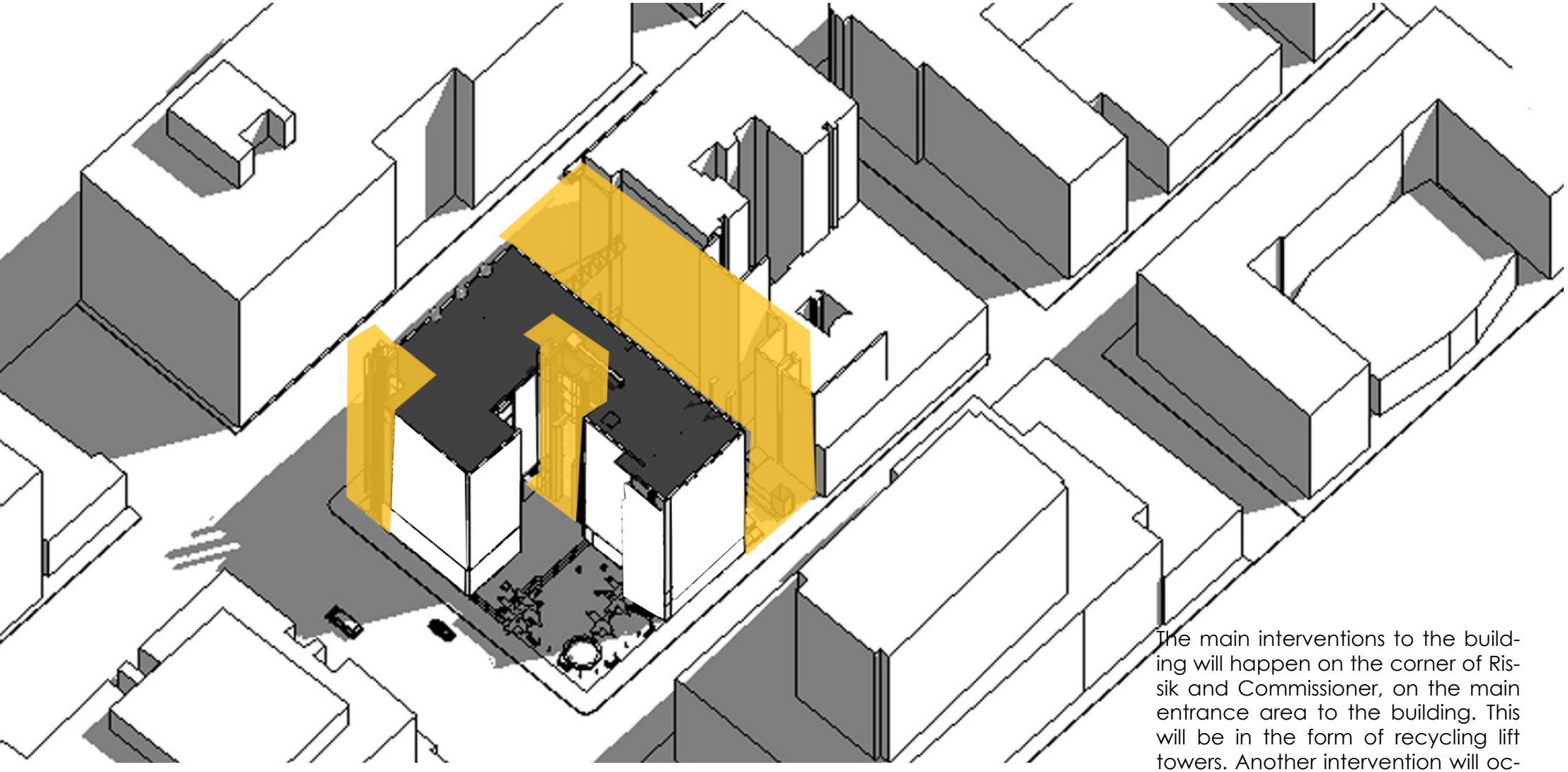


Sketch 13:

The process of recycling utilizes a lot of mechanical machinery. These machines utilise large amounts of energy but in order to create an efficient system, the concept is to lift all the recyclables once and then have the different recycling processes occurring as the materials come down this way the process is mainly driven by gravity. Architecturally, these lifts would be expressed on the building envelope as towers almost becoming markers.

This project is about raising awareness and educating about recycling. From that one of the concepts to be used in the building is to expose some of the recycling processes both on the interior and the exterior of the building. This way people are constantly aware of what the building is about from the outside and from the inside of the building.

Figure 66: Nampak paper recyclers in Johannesburg. [Author]

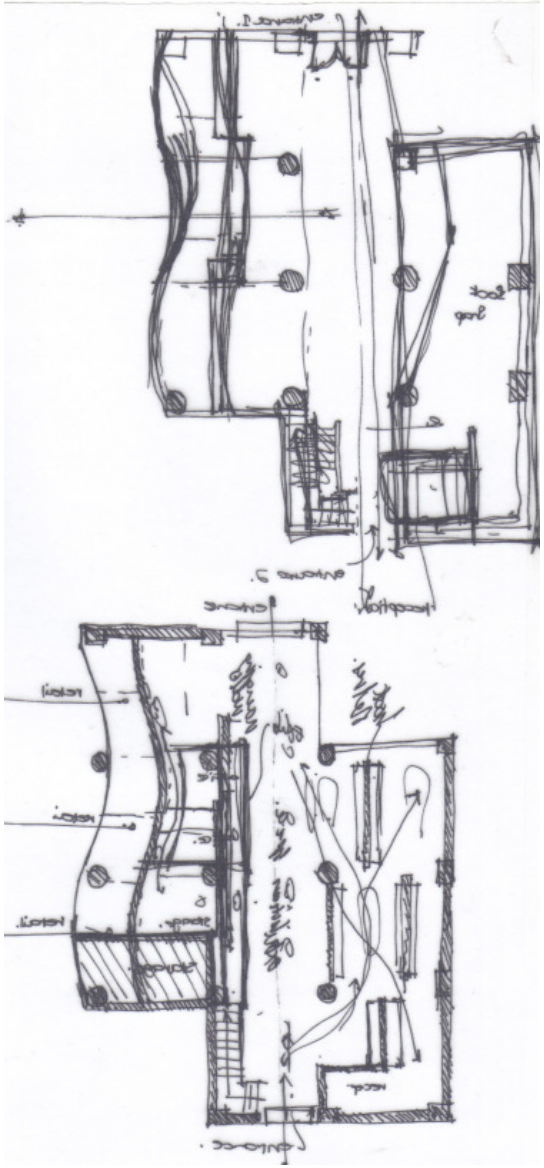


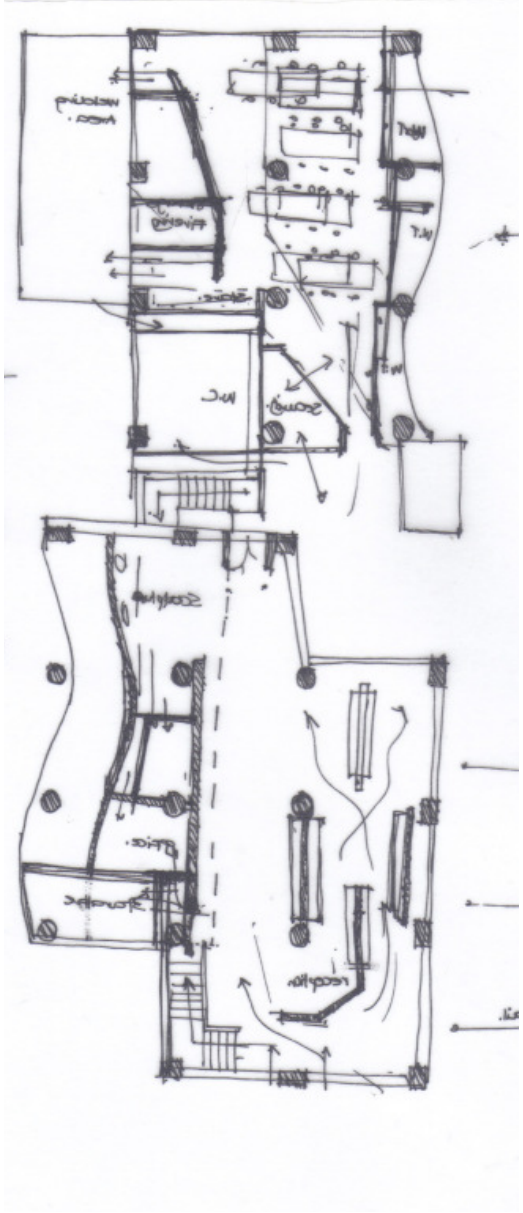
The main interventions to the building will happen on the corner of Rissik and Commissioner, on the main entrance area to the building. This will be in the form of recycling lift towers. Another intervention will occur along the strip of land on the eastern side of the site. This will be the dispatch and drop-off area for the waste.

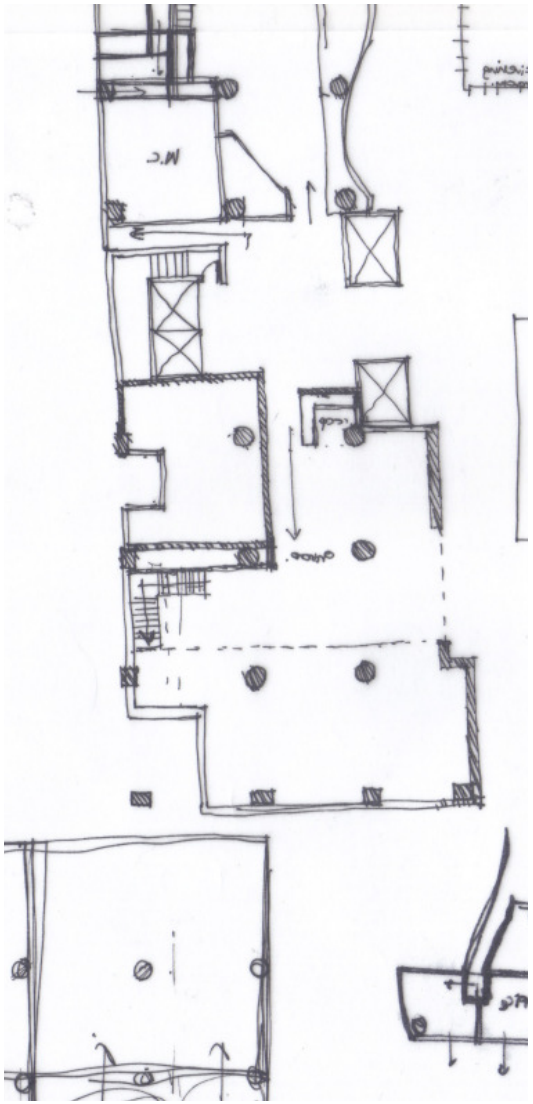
Vehicular movement through the site

Pedestrian movement through the collection/ dispatch area

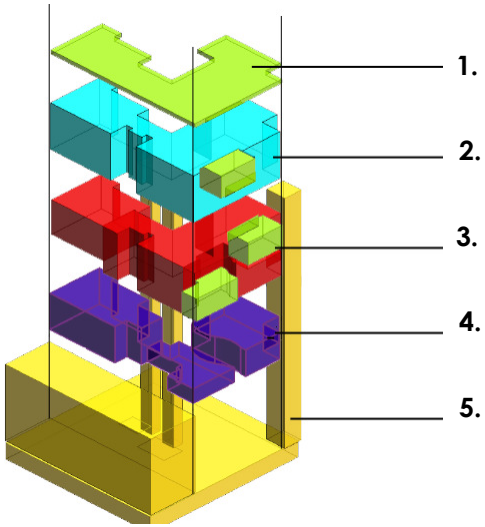
Pedestrian movement through building





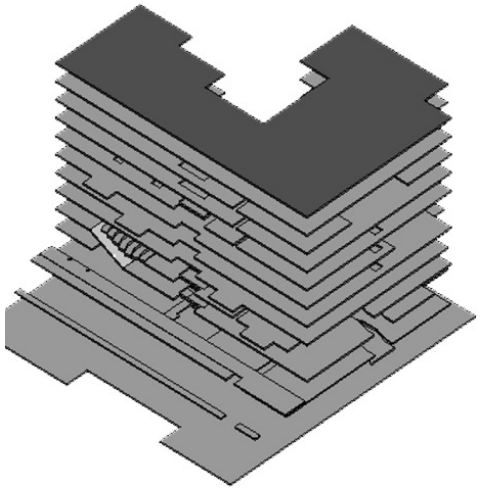


PROGRAMME DISTRIBUTION



Stacking of the different components of the programme

+



Existing floor slab

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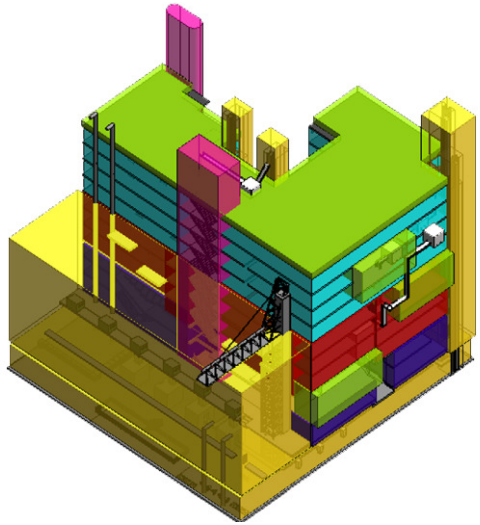
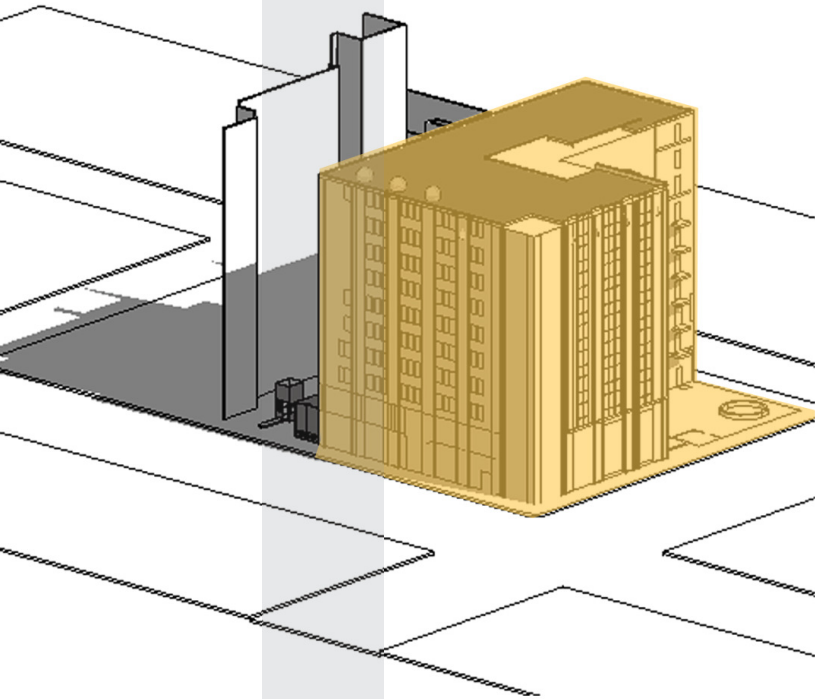


Consolidated existing floor slab and building programme

The buildings programme is made up of five main components which are distributed vertically through the building. 1. The main recycling process which includes the dispatch and drop-off area along with the recycling towers. 2. The educational and the exhibition spaces located on the ground and first floor. 3. Storage for the processed goods is spread over four floors with each floor storing a different material; glass, plastic, paper, cans. 4. Rentable office space to be rented to various environmental activists. 5. Green spaces that are distributed throughout the building in the form of roof gardens, green balconies and green courtyard spaces.



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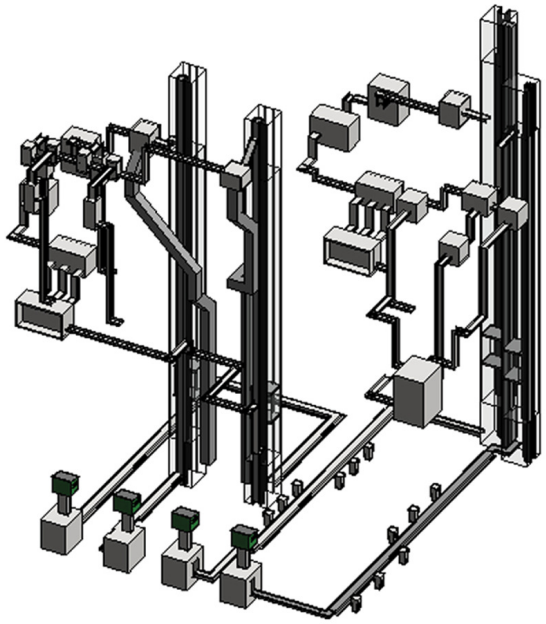

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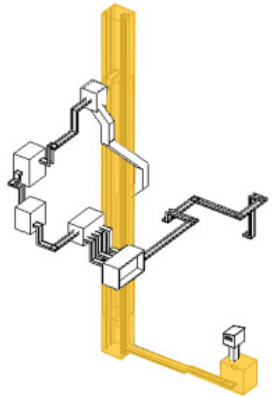
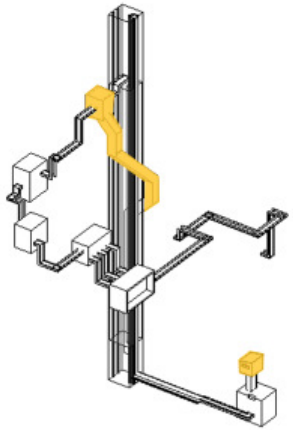
Ecologic Cyborg

The coming together of the recycling machine and the existing multi storey building creates a new hybrid.

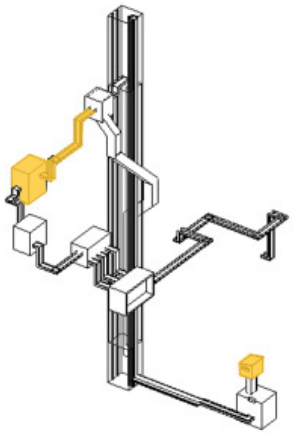
PLASTIC RECYCLING MACHINE



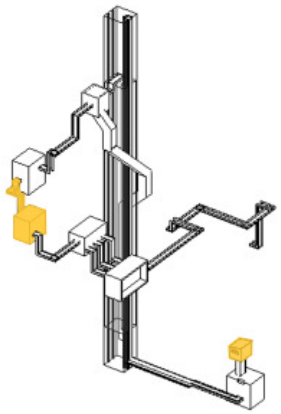
2. Manually sorted waste moves to tower



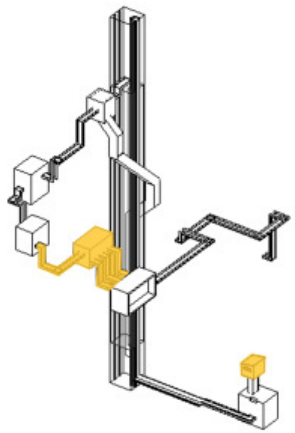
3. Infrared sorting where unwanted waste gets separated



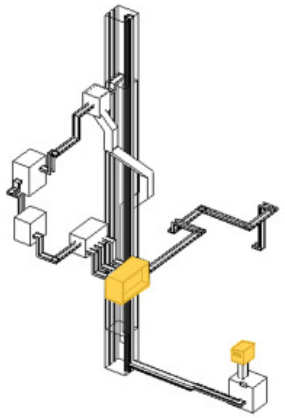
4. Plastic waste gets shredded



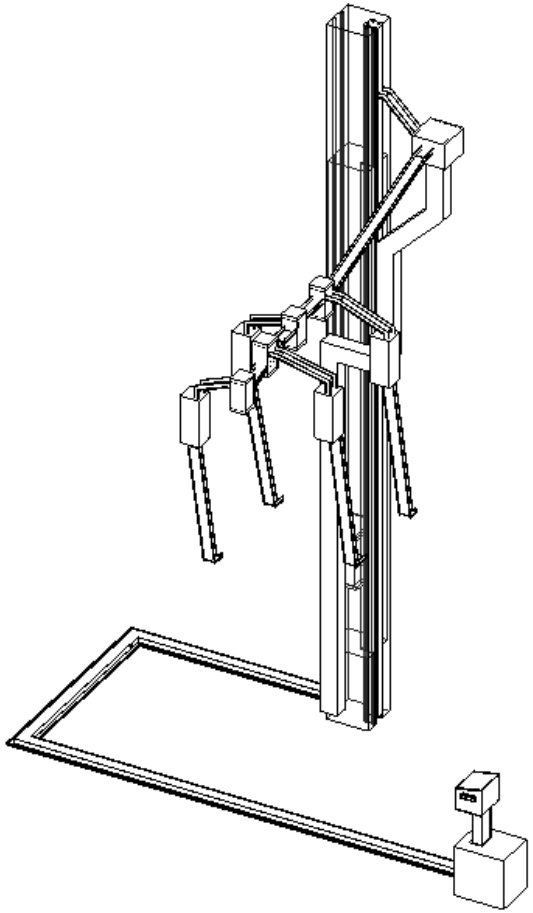
5. Shredded plastic waste gets washed



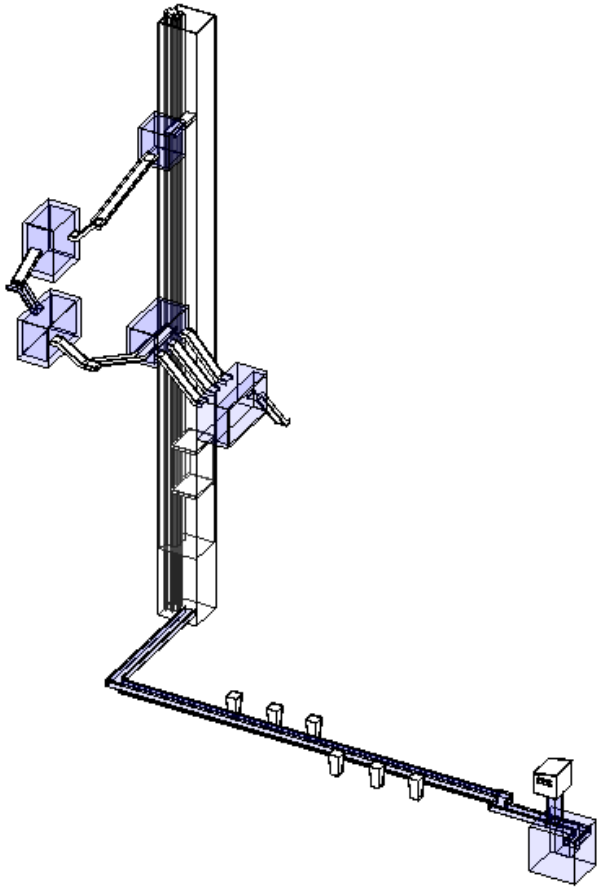
6. Shredded plastic gets separated



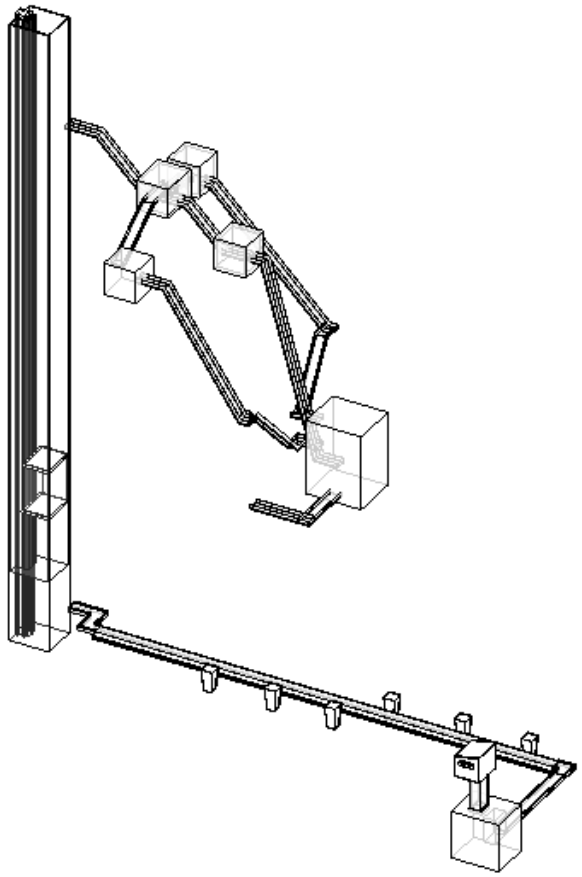
7.Separated plastic gets bailed and stored



Paper Recycling machine.



Glass Recycling machine.



Metal can Recycling machine.

Part 4

Design technology

Design Technology

The previous chapter was about developing and generating some design ideas and concepts. In this project, the recycling process utilizes a lot of machinery which need to be accommodated for within the building.

The coming together of the recycling machine with the existing building also creates a hybrid; half building half machine. Along with this, come a few challenges. Introducing industrial machines into a building structure that had not been intended for industrial use creates some of these challenges some of which include:

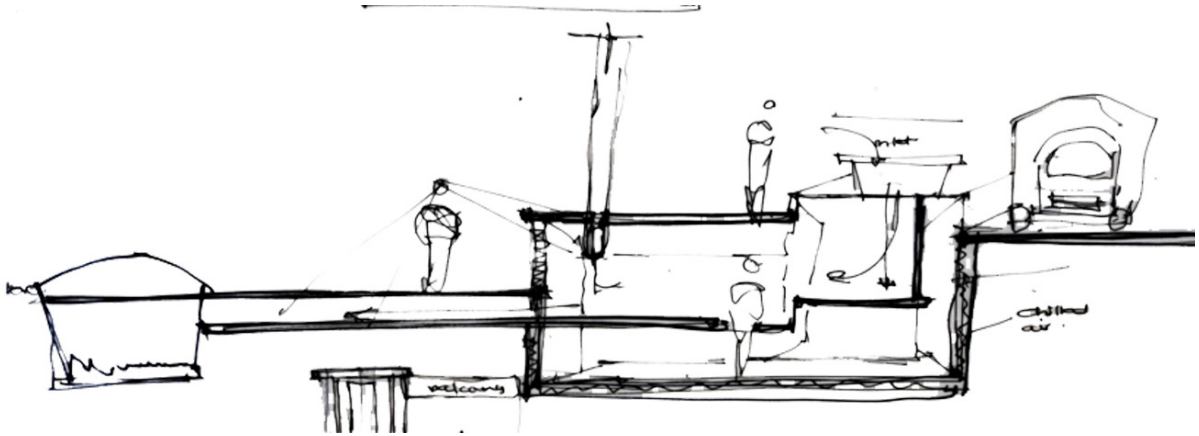
1. The smell coming from the sorting area.

2. Vibrations and noise from the recycling machine.

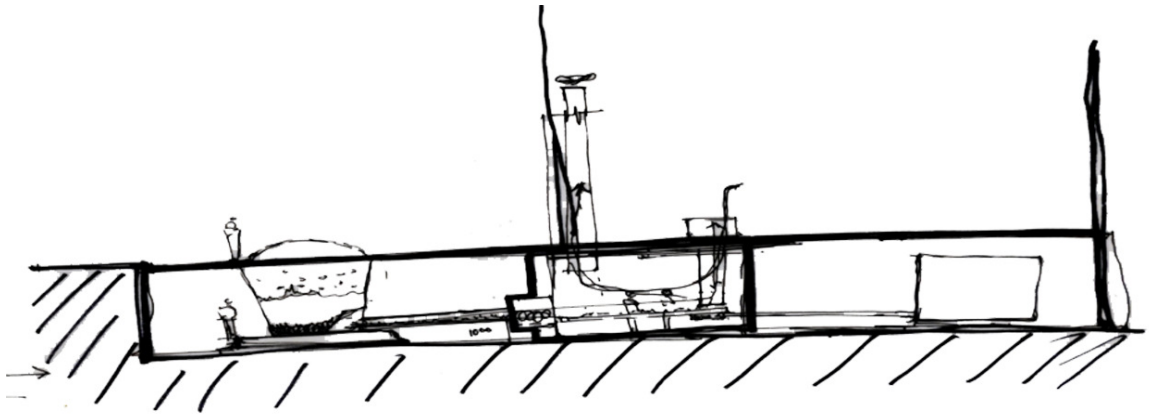
4. Breaking and adding to the existing structure.

In the following chapter, a perimeter section was cut though the building to demonstrate how the issues that were discusses above are addressed.

ODOUR CONTROL

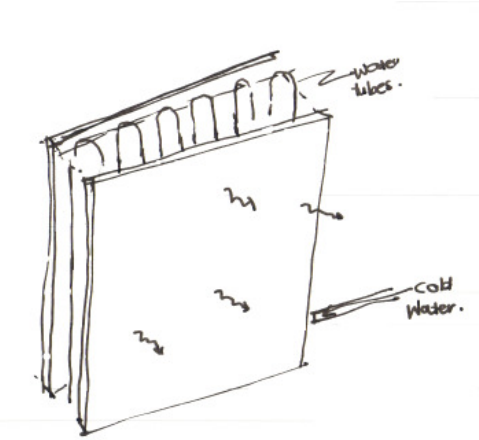


Sketch 1:

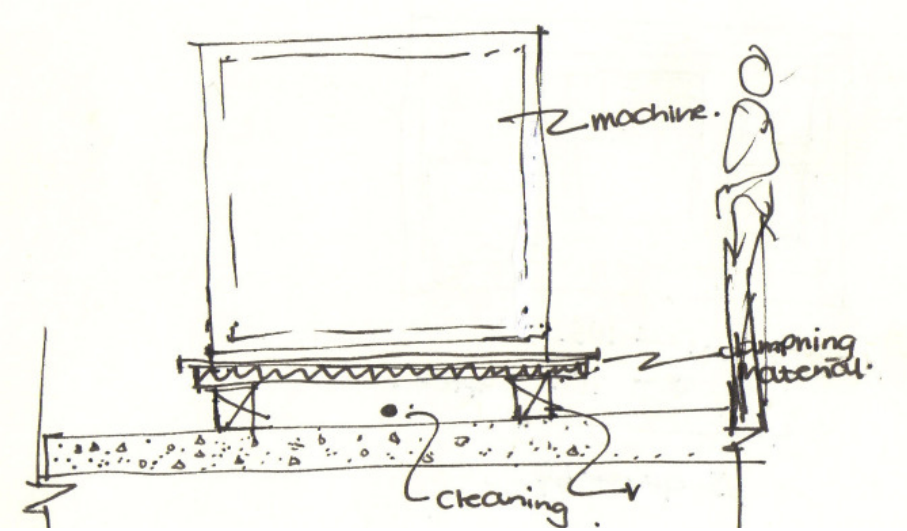


Odour control, especially in a space that deals with organic waste is important. If organic waste is left untreated, the waste starts decomposing, giving off a foul smell. In an area where there are work and living spaces close by, this becomes an issue.

To deal with this, my proposal is to create a cold storage area in the basement of the building where all the waste sorting will occur. This room will essentially be a cold room, where the unprocessed organic waste will be kept cool; slowing down the decomposing process; then using an extractor system to expel any odour that may have been created. The reclaimed black water will be used to keep the storage walls cool.

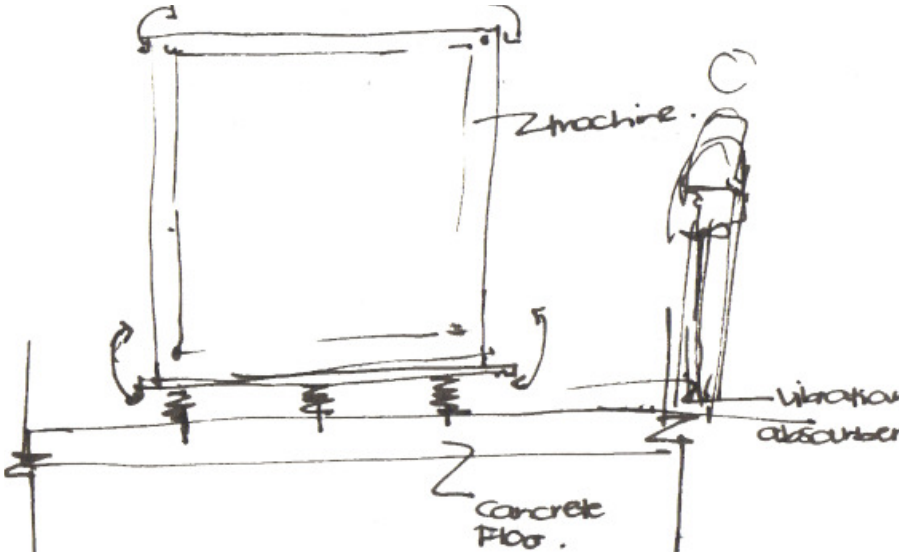


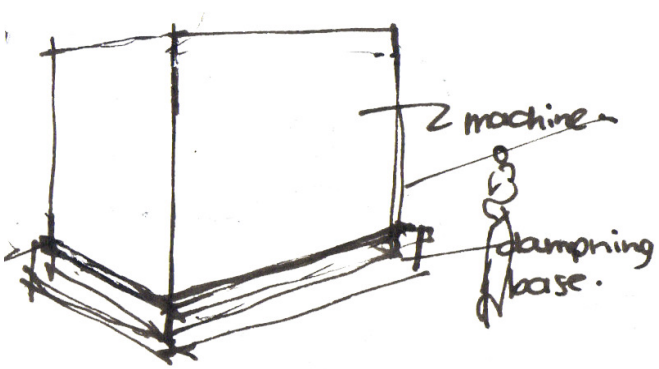
VIBRATION AND NOISE CONTROL

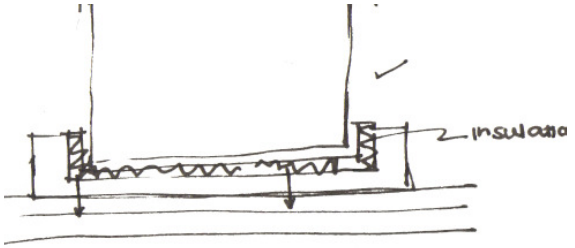


Most of the machinery that is used in the building is constantly moving and vibrating during the recycling process. This may cause a lot of problems and damage to the structure of the building as the original structure was not designed with the forces of moving machines in mind. Along with this, the machines generate noise which could be destructive and cause annoyance to the people working in the building.

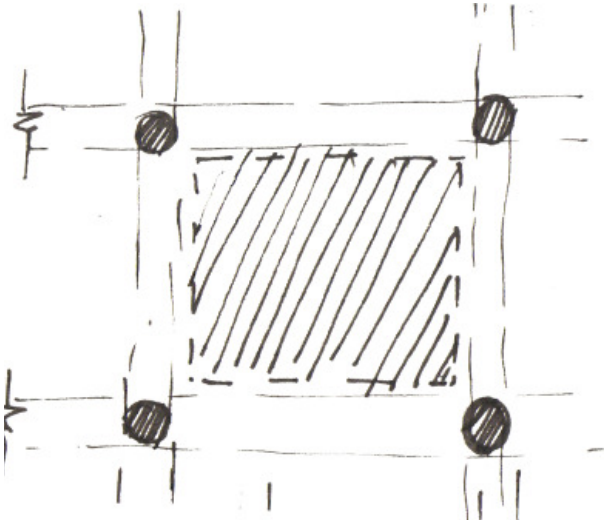
My proposal is to install vibration insulation pads under the machinery. This will reduce the resonant energy in the machine thus reducing the noise that is transmitted. Acoustic barrier panels will also be installed around the machines in the office spaces to dampen and reduce the noise that is generated.

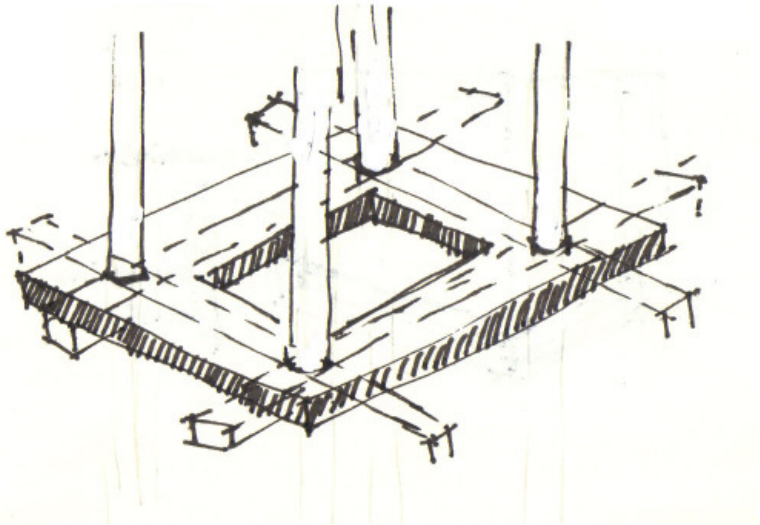






BREAKING AND ADDING TO THE STRUCTURE





All the floor spaces in the building are single story and single volume. Because the recycling process occurs freely throughout the building, spaces that are larger than a single volume are sometimes required.

My proposal to achieve these spaces is to break into the floor slabs to create these volumes. The current building structure is on a 5 by 5 meter structural grid which means that the openings should be done within these perimeters and cutting into beams should be avoided. Adding to the structure will be done through the use of steel structures which will be attached to the building.

Exhaust pipe from the air extractor to help expel any of the smell that may have been generated from the cold room.

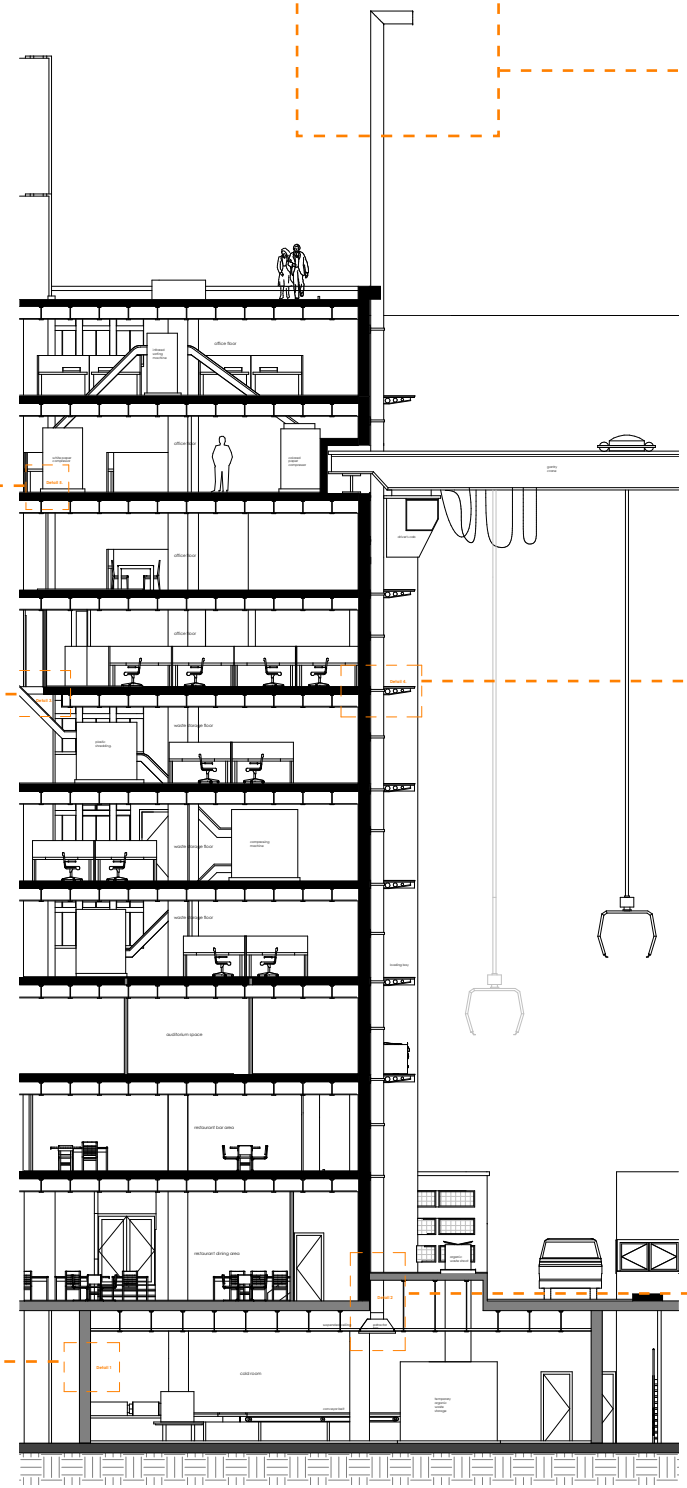
Vibration insulation pads to be installed under the machines to reduce structural damaged caused by vibrations from the machine. See detail 5.

Steel structure added to the building. In this case the structures are loading bays where the processed materials are retrieved before they are loaded to be delivered to third party industries. See detail 4.

Existing building structure broken into within the parameters of the current 5 by 5 metre structural grid to accommodate the recycling process. See detail 3.

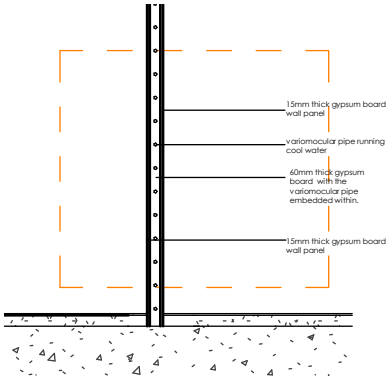
An air extractor is used to remove any of the smells that may be created in the basement. See detail 2.

A cold room in the basement area for the sorting of organic waste also to slow decomposing process of the waste. Reclaimed water from the sewer is used to cool the walls. See detail 1.

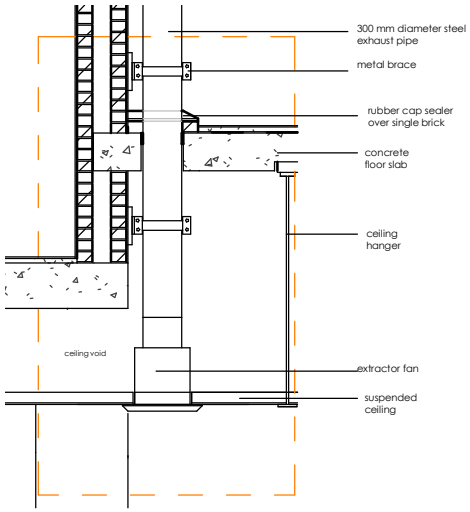


perimeter section through building.
Note: drawing not to scale

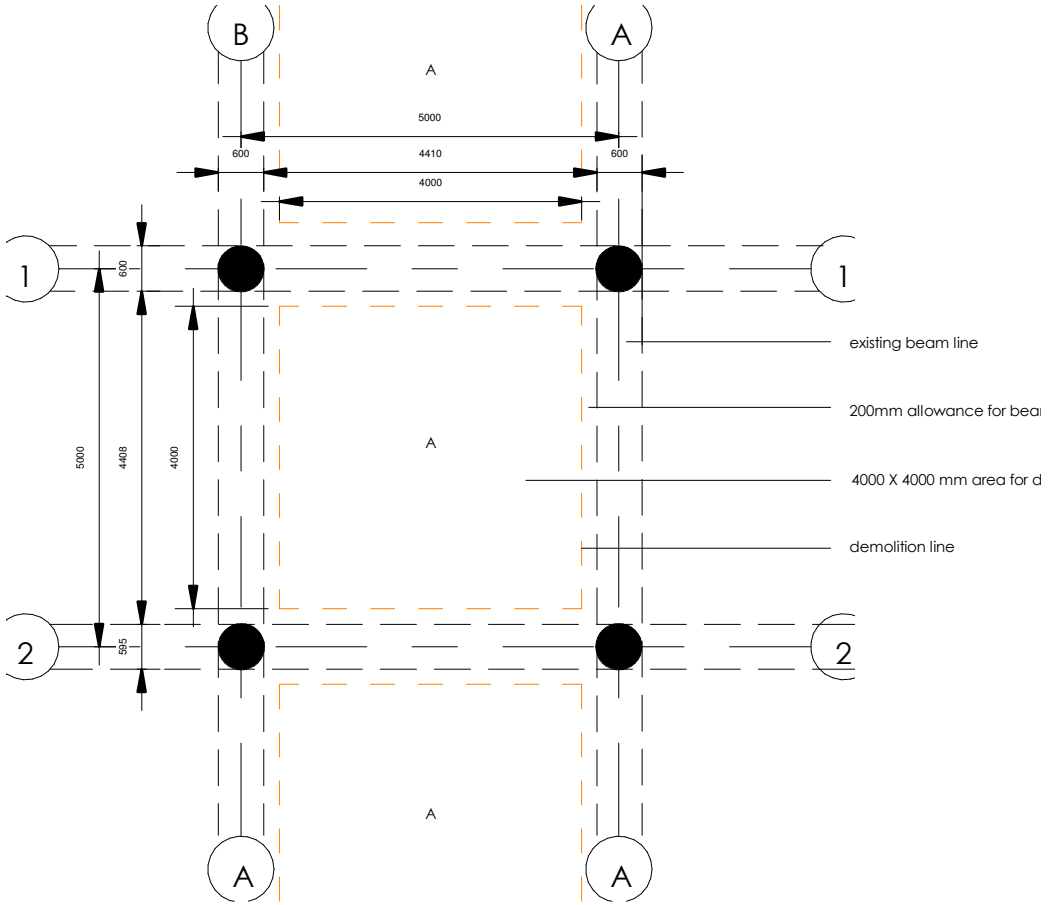
DETAILS

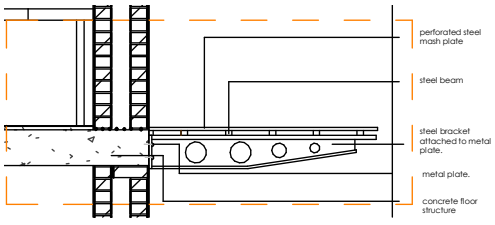


Detail 1

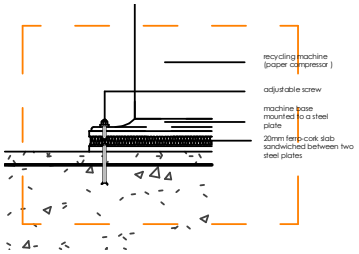


Detail 2





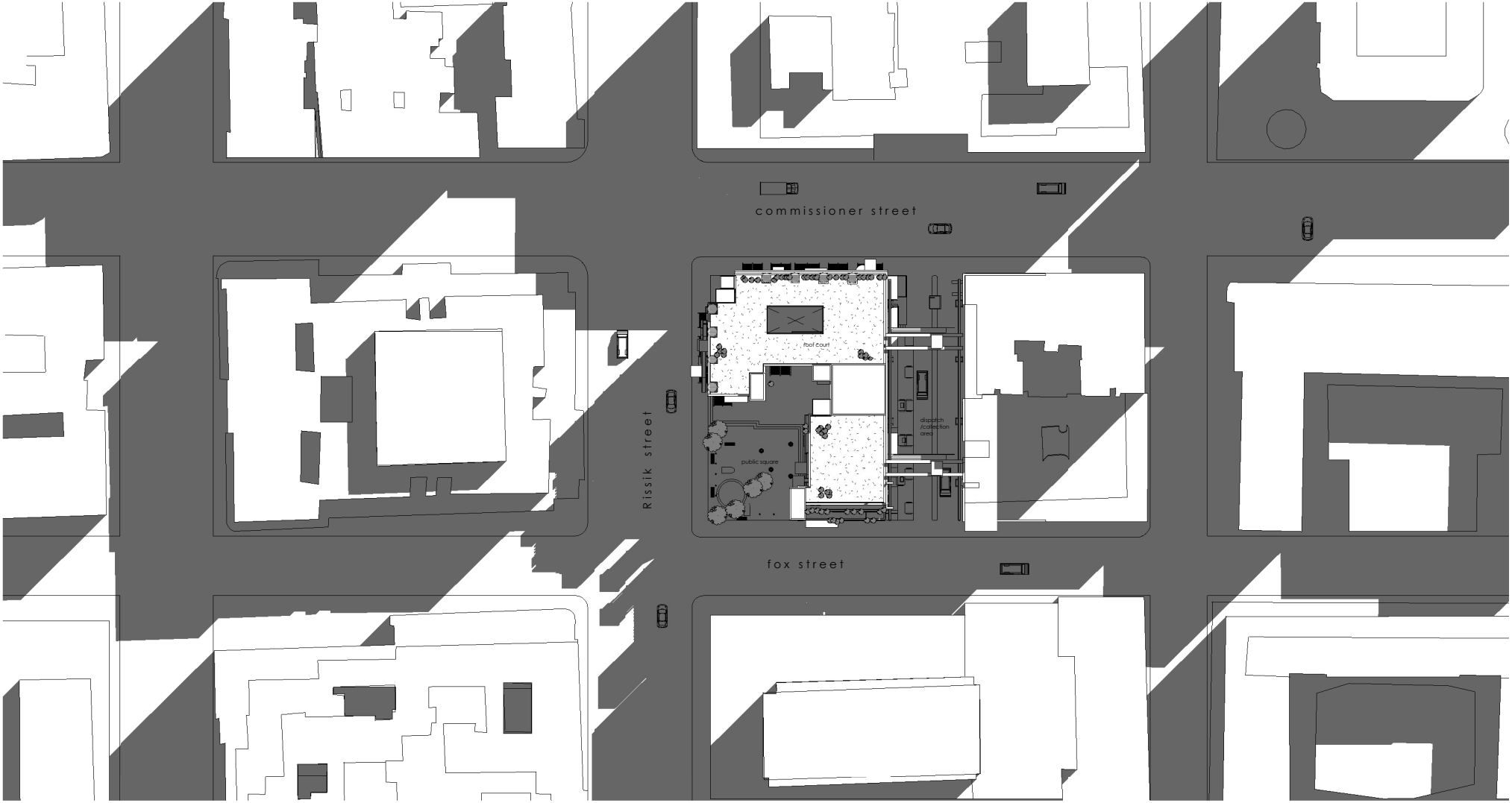
Detail 4.

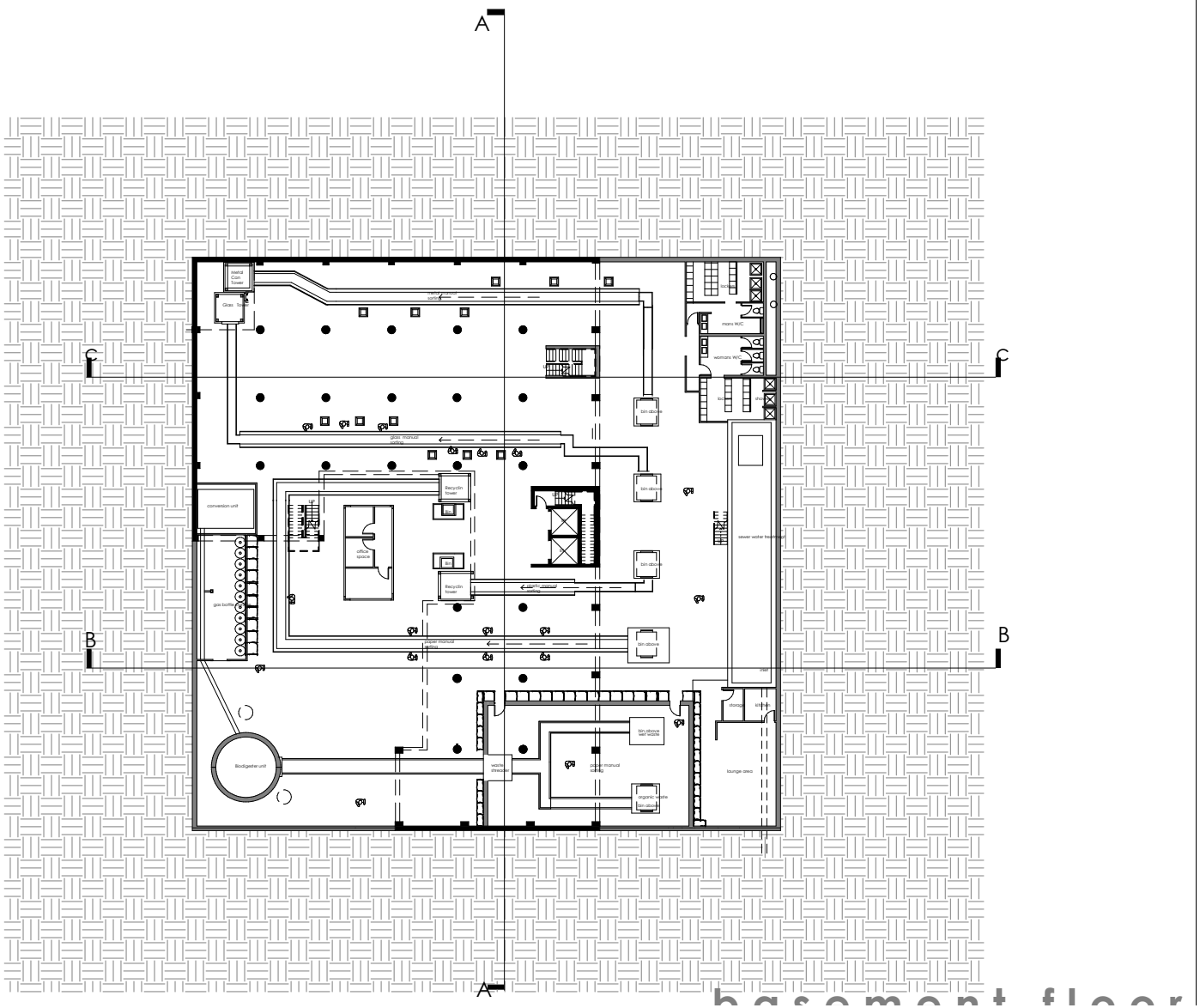


Detail 5.

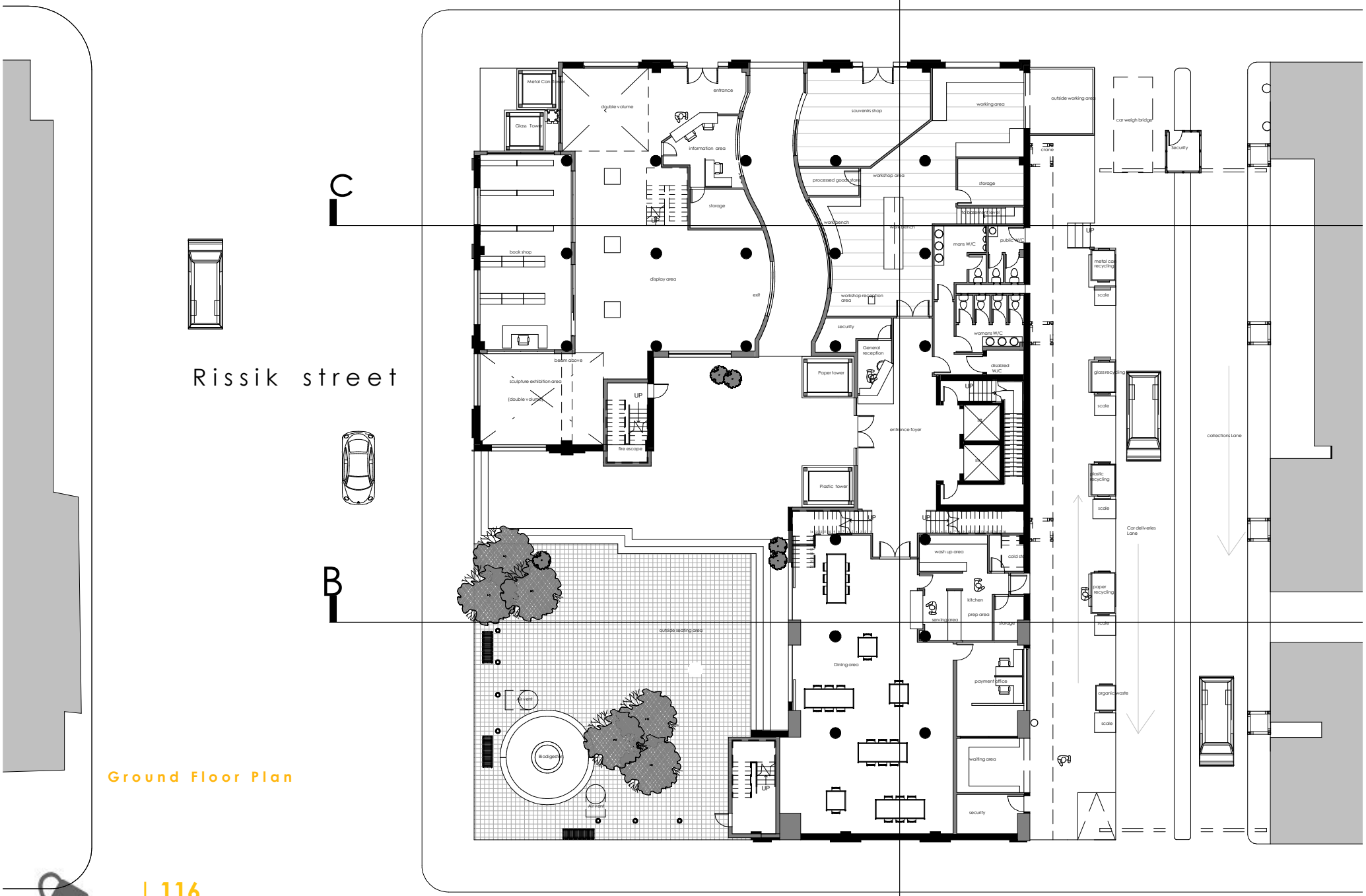
Part 4

Design Drawings

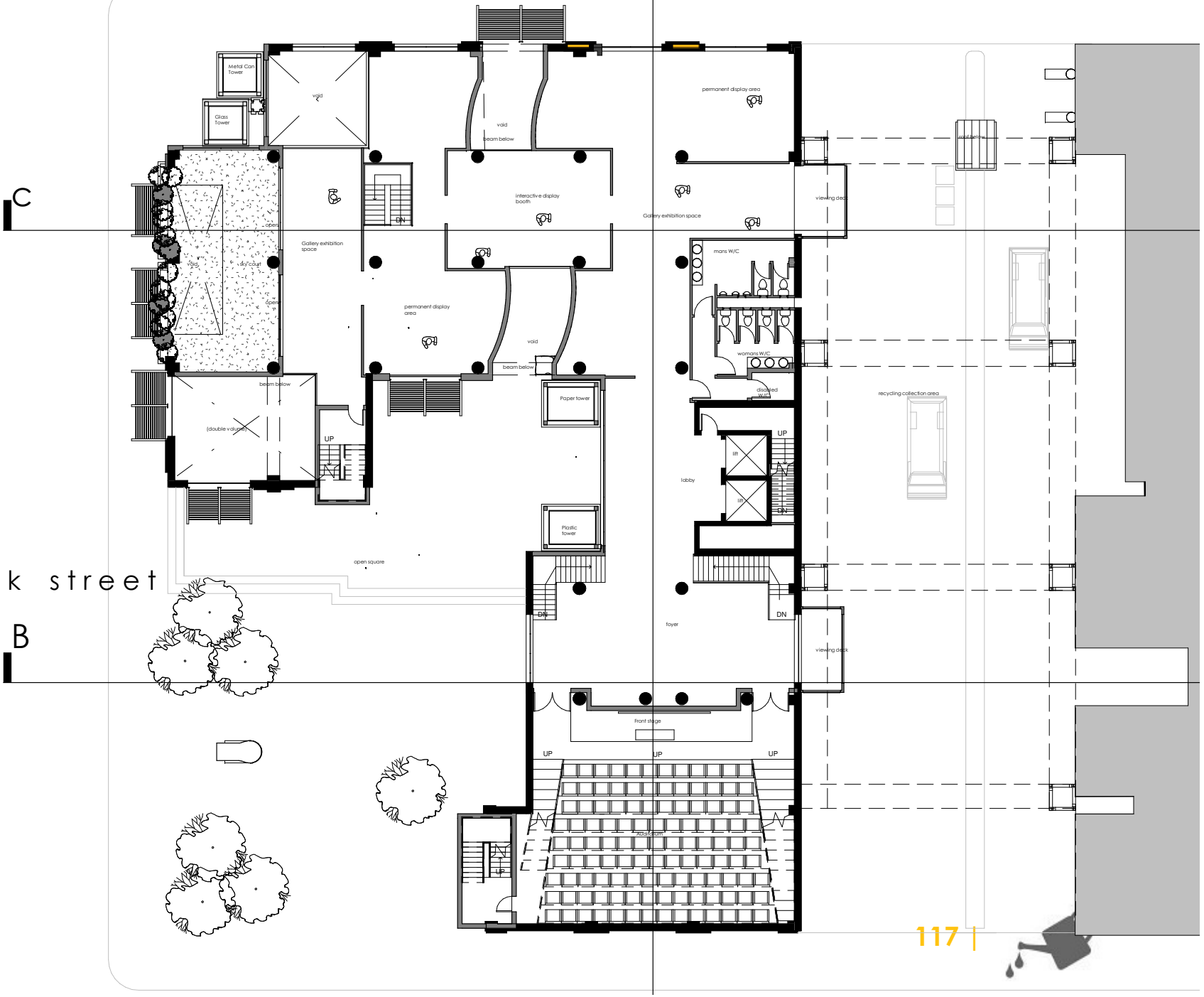

commissioner street
Rissik street
fox street
food court
public square
dispatch
/collection
area



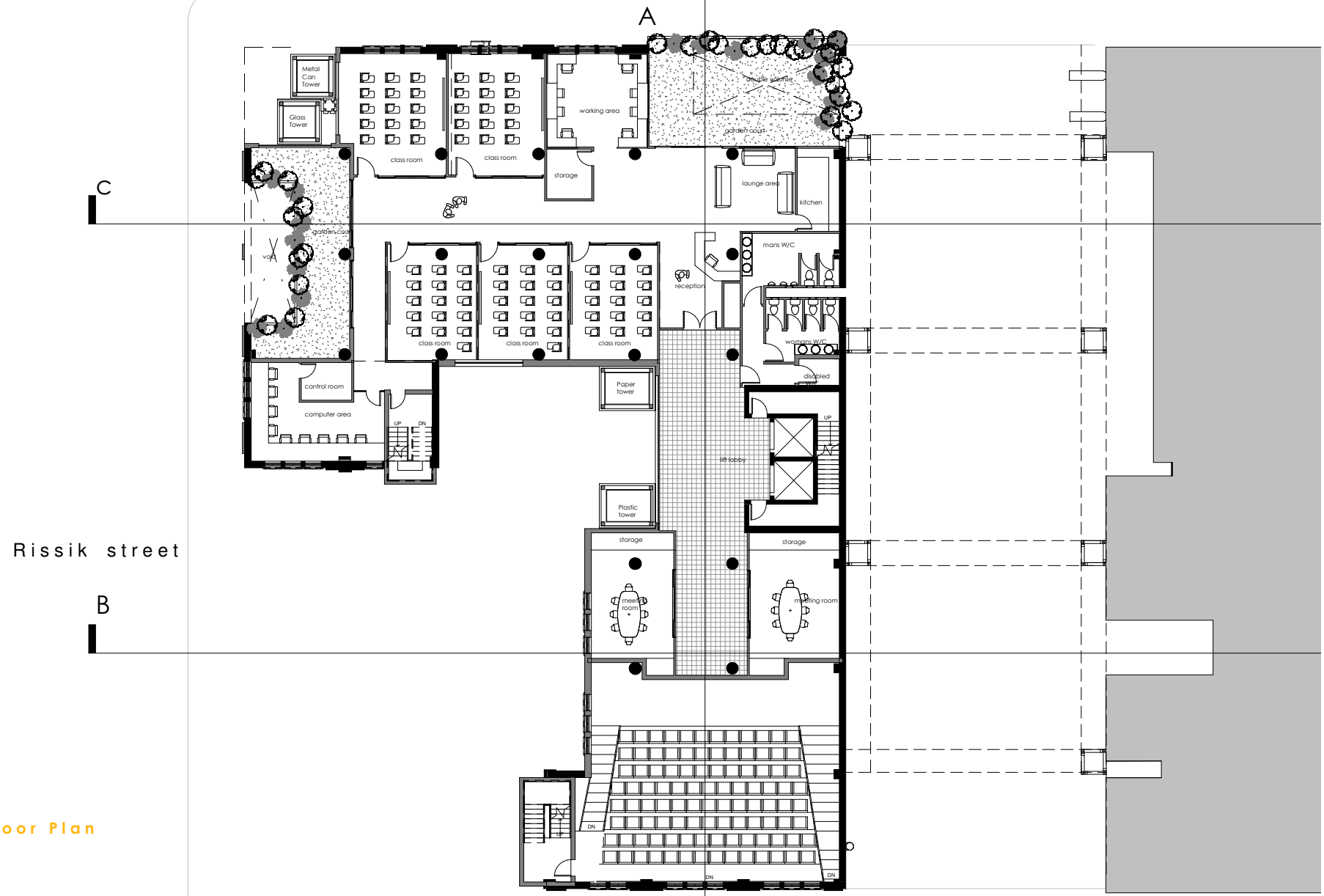
Basement floor
Scale 1:250



Ground Floor Plan

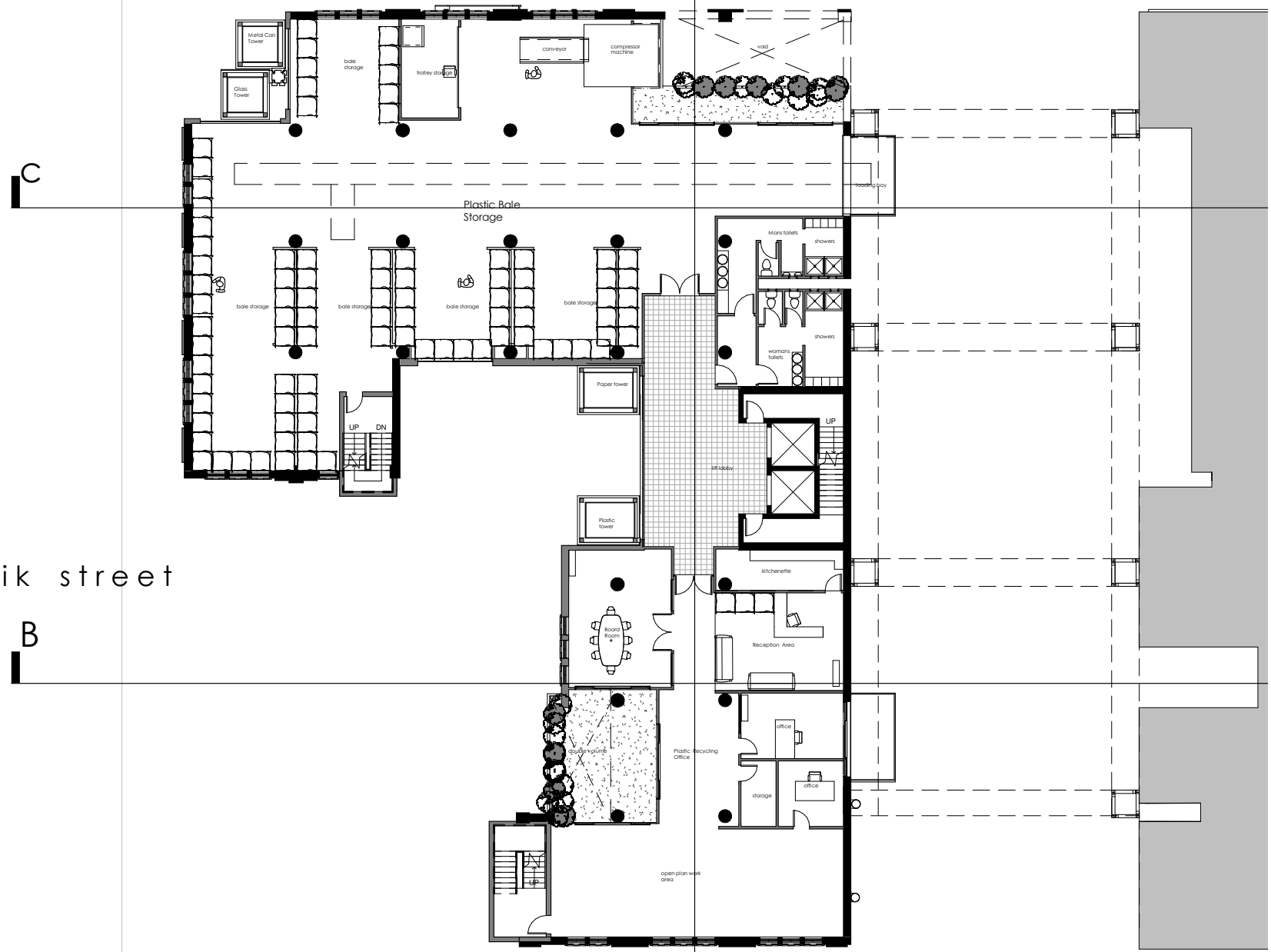


First Floor Plan



Second Floor Plan

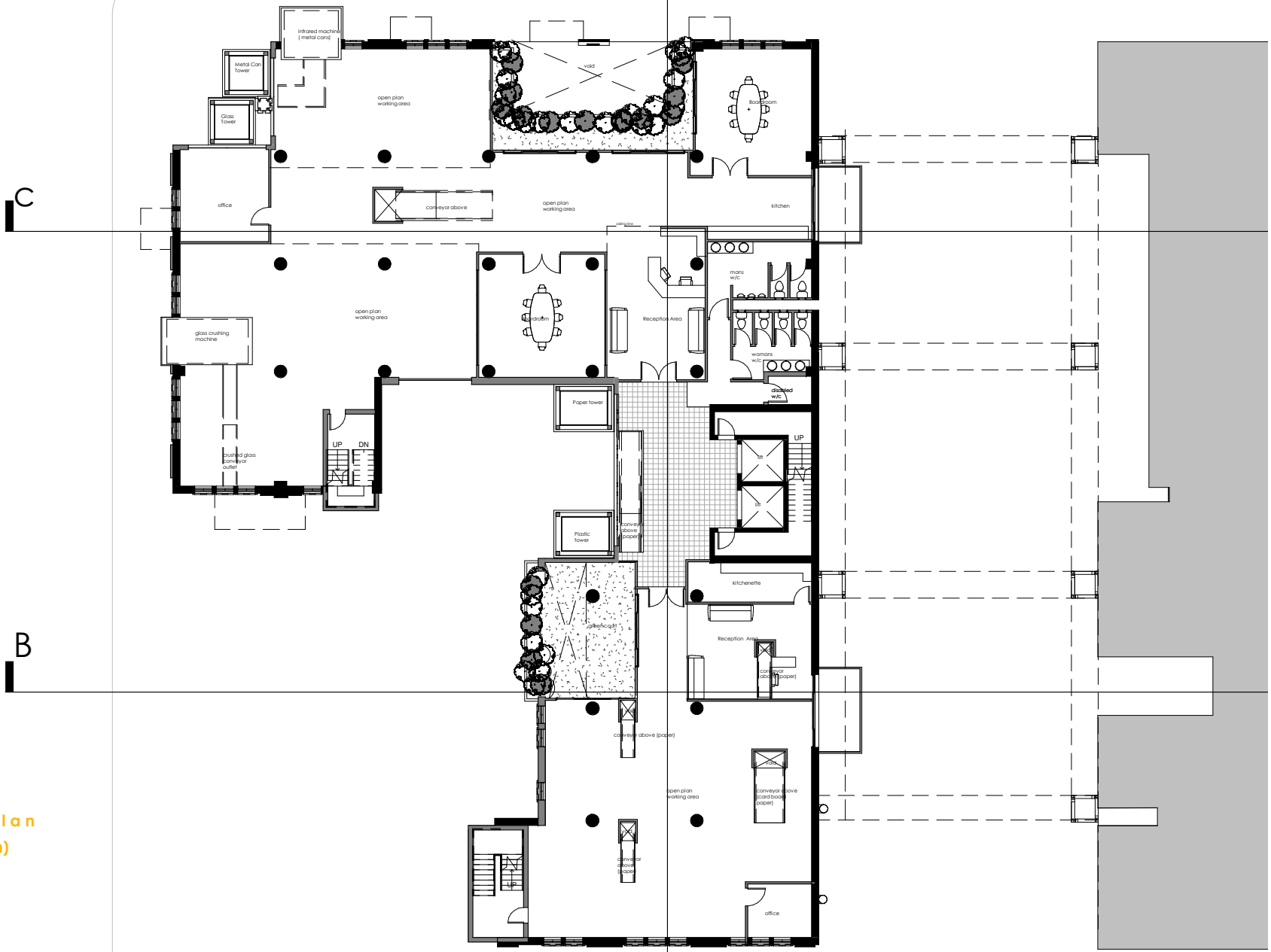
commissioner street



Rissik street

fox street

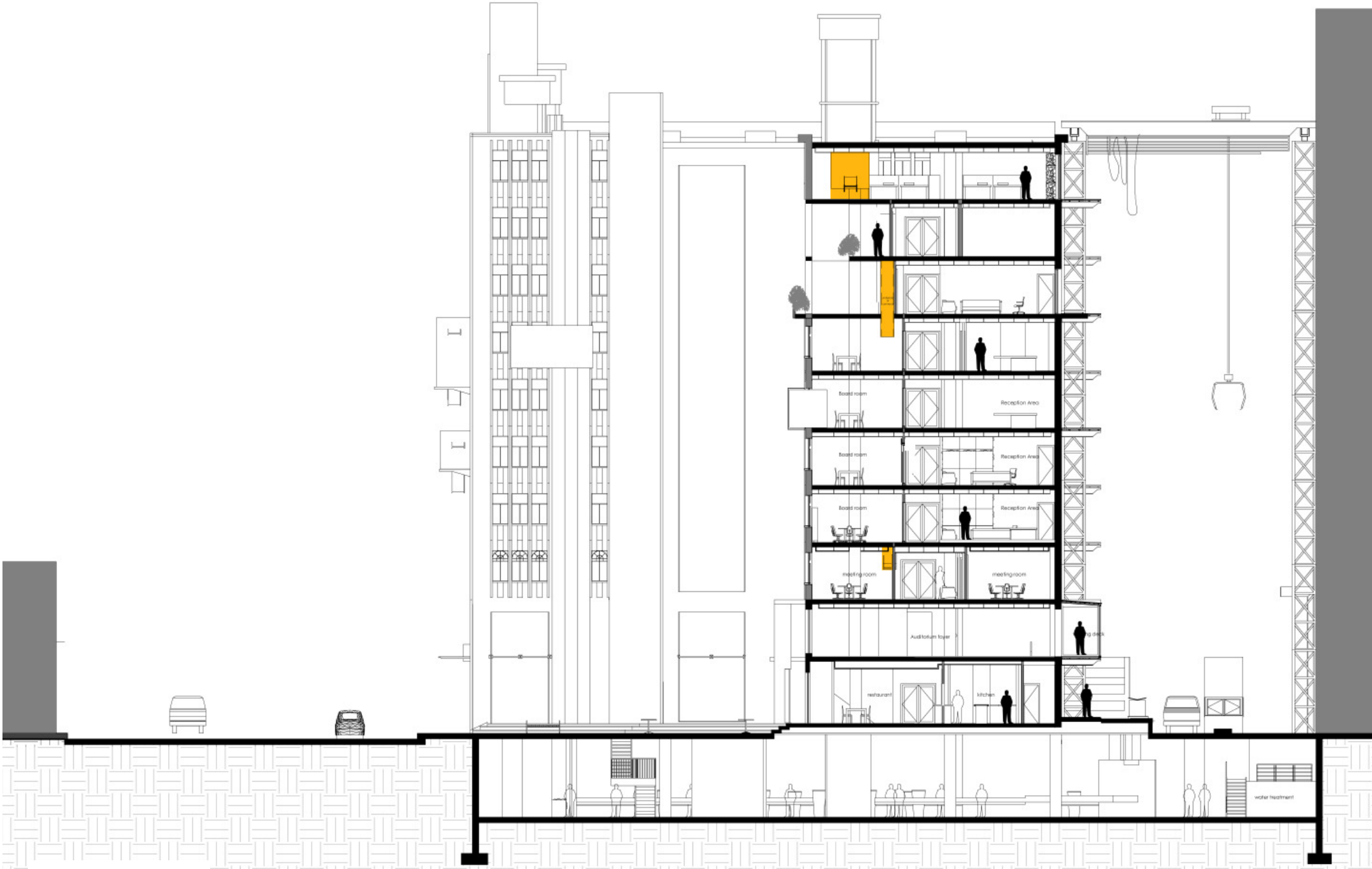
Third Floor plan
(Typical storage floor plan)



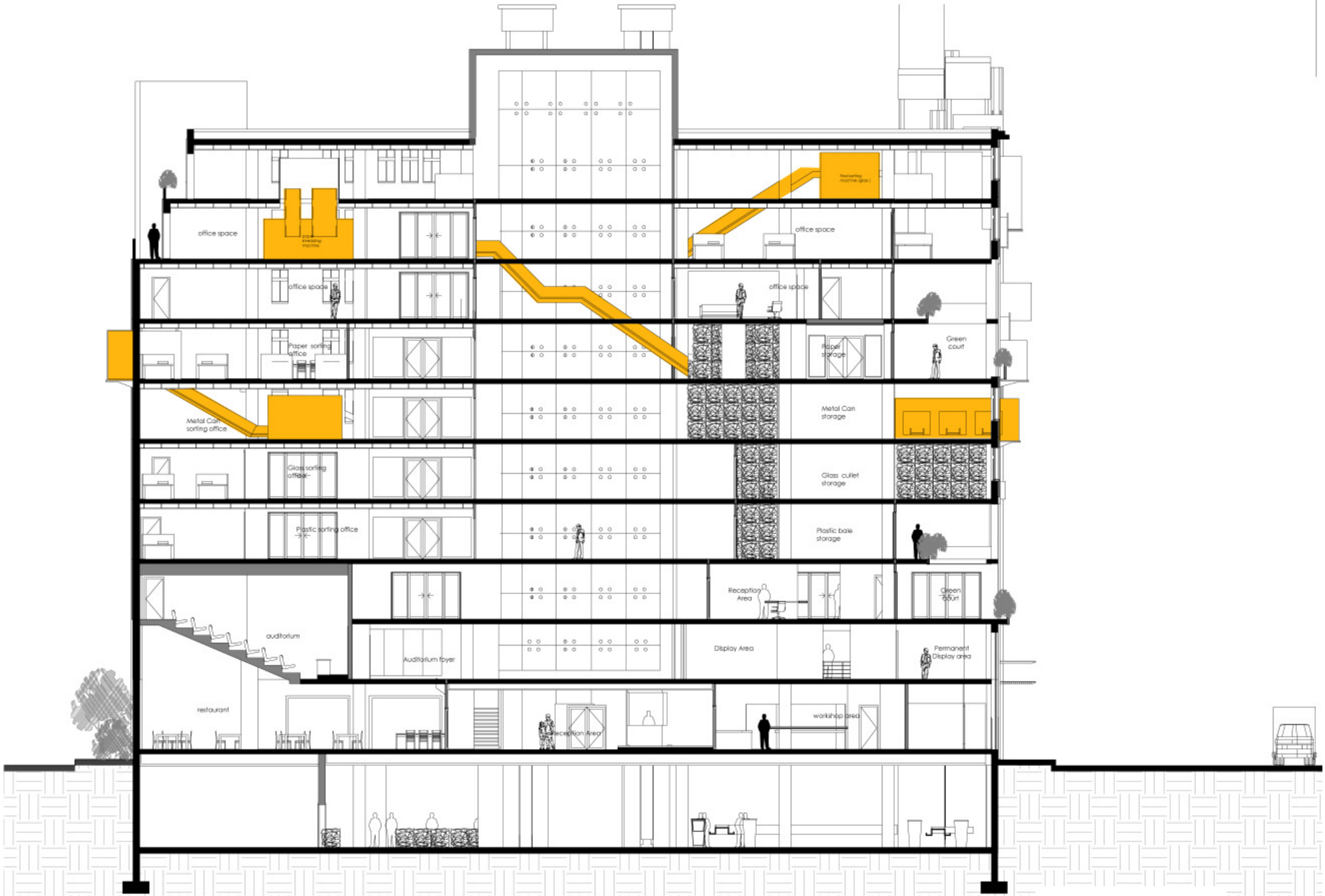
Seventh Floor plan
(Typical office floor plan)


magnetic sorting machine
Open Plan working area
Open Plan working area
Open Plan working area
Paper bale storage
shearing machine
metal compressor machine
bale storage
bale storage
bale storage
card bale storage
green court storage
Plastic bale storage
Office
green court
Display area
Interactive Display area
Display area
viewing
Book Shop
Temporary display area
walk way
workshop area

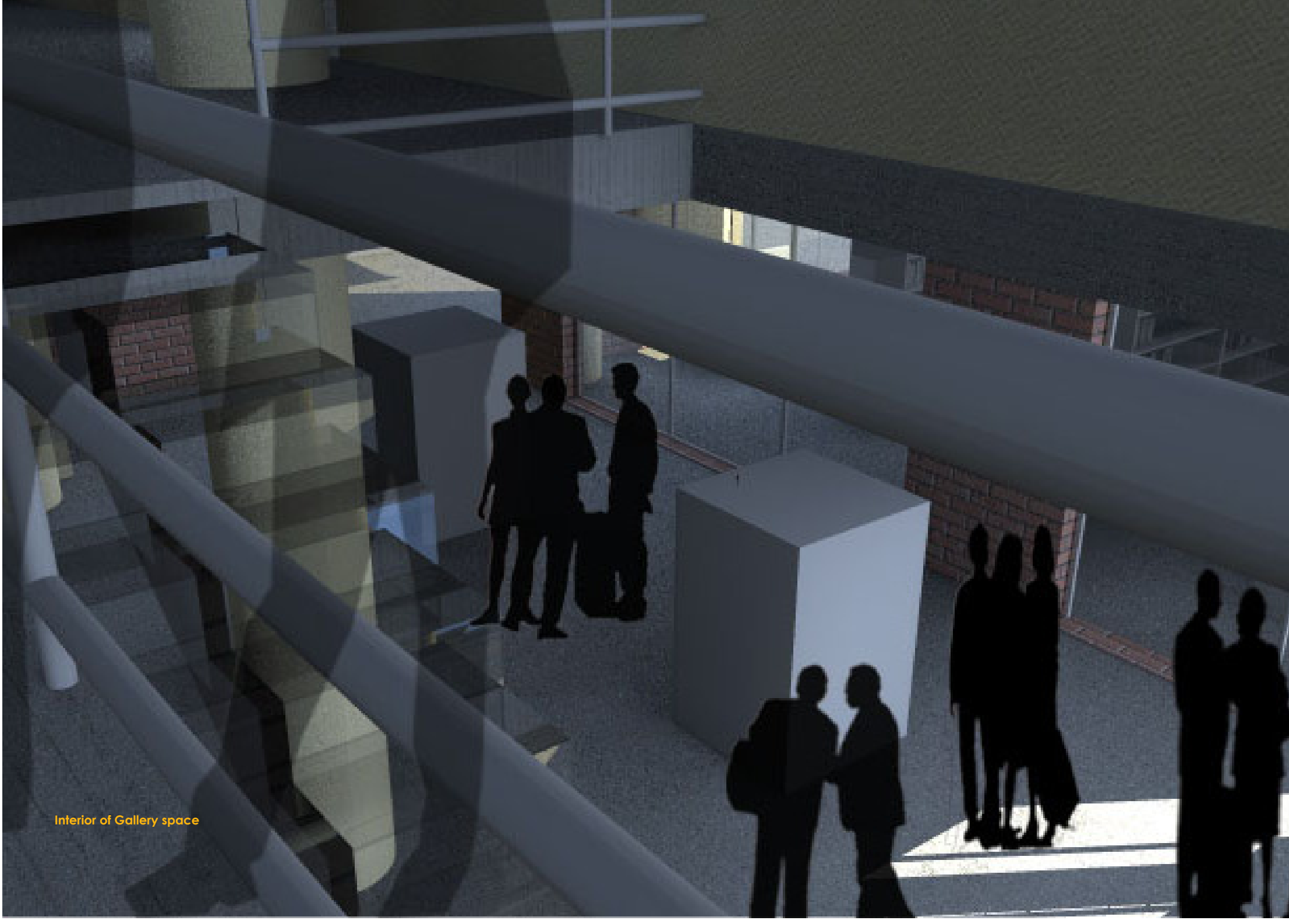
ection C-C


Board room
Reception Area
Board room
Reception Area
Board room
Reception Area
meeting room
meeting room
Auditorium foyer
restaurant
kitchen
water treatment

Section B-B


office space
office space
office space
office space
Paper sorting office
Paper storage
Green court
Metal Can sorting office
Metal Can storage
Glass sorting office
Glass cullet storage
Plastic sorting office
Plastic bale storage
Reception Area
Green court
auditorium
Auditorium foyer
Display Area
Permanent Display area
restaurant
workshop area
Reception Area

Section A-A



Interior of Gallery space


South East View

Part 4

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